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R. H. STINCHFIELD, *Editor*

Editorial Office: 1155 16th Street, N. W., Washington 6, D. C.

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TABLE OF CONTENTS, FEBRUARY 1951

Uncle Sam's Acres 3
Jeff Discusses Their Management

The Land-use-pattern Scale 6
A Practical Method Described by Otis T. Osgood

Grassland Farming Brings New Management Problems 13
John B. Abbott Tells How He Solved Them

Kay-two-oh in California 17
George P. Gray Explains the Needs

Soil Treatment Improves Soybeans 21
H. J. Snider Gives the Evidence

You Can't Be a "Compass" Farmer and Build up Run-down Soil 24
An Example Showing Why by W. H. Lathrop

What Is Fertilizer Worth? 26
L. Glenn Zinn Answers the Question

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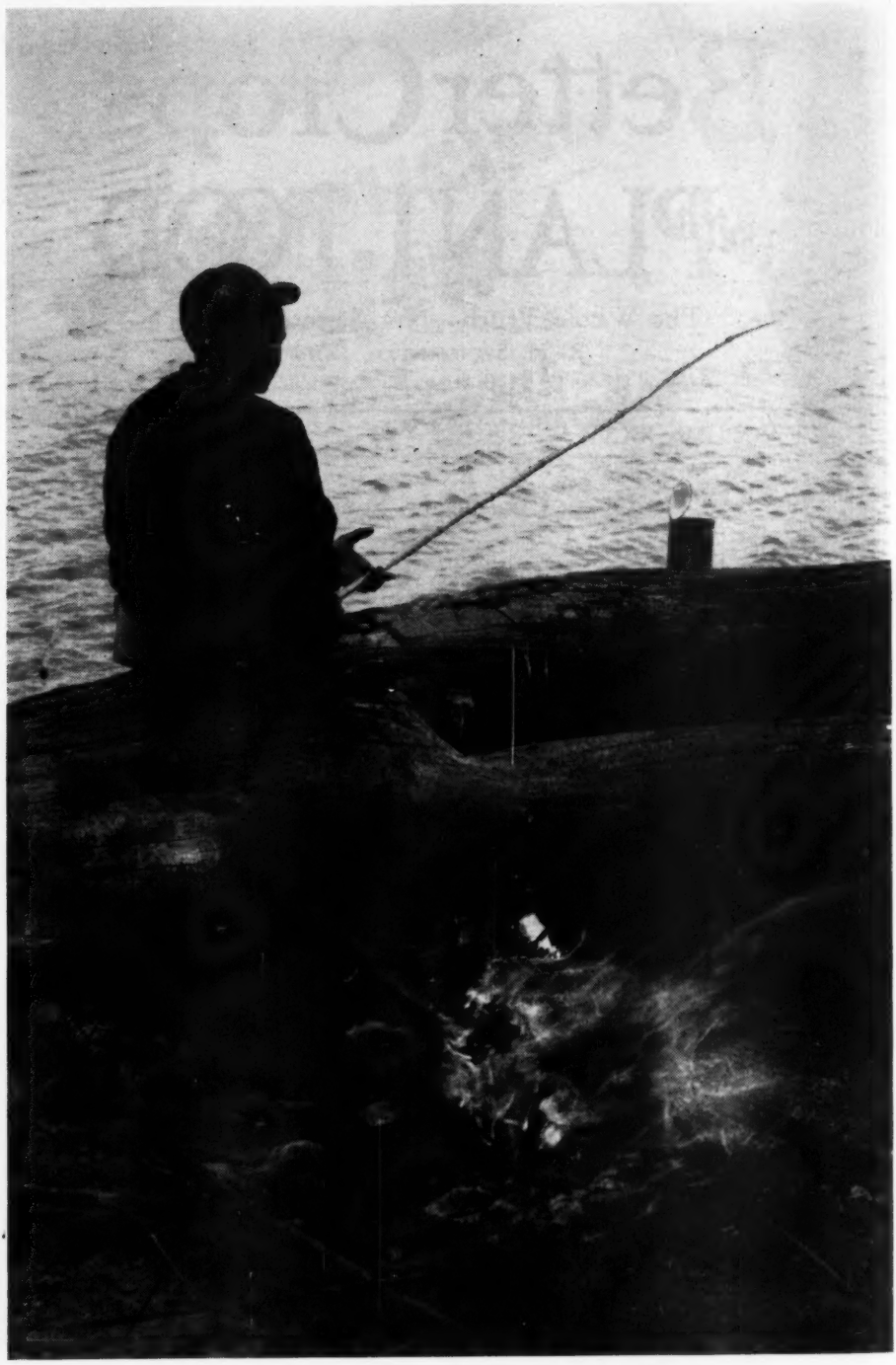

THIS ARDENT FISHERMAN BELIEVES IN COMFORT.

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VOL. XXXV WASHINGTON, D. C., FEBRUARY 1951 No. 2

The Management of . . .

Uncle Sam's Acres

Jeff McDermid

DO you remember when our old geographies contained colored maps of the United States with a large unbroken area defined in a vague way as the Great American Desert? And beyond that was California, a long strip of territory but sparsely settled and still reeking with the traditional romances of Bret Harte and Mark Twain. Those were the times when there were a few homesteaders still hiking out to try their luck in the raw wilderness without any neighbors within a hoot and a holler or maybe a long day's march.

Well, as we have had occasion to say many times since, "How vastly times have changed!" California is now bragging about being the fastest growing state in the Union. Livestock raisers are hard at it trying to furnish enough meat and other provisions for the bulging maw of a populous and hungry horde. And incidentally, all of the best land is settled or citified, and the word "desert" is narrowed down to just a few scenic attractions which are often more profitable to local residents than the black loams of the Corn Belt.

Today the unappropriated public domain still owned by Uncle Sam exists mainly in 11 Western states. These 170 million acres are all that are left after the rush of homesteading. They are what remain after the national forests were separated, and after the creation of all the national parks and Indian reservations, the game preserves

and similar tracts dedicated to particular uses.

Now we face a keen demand for any and all forms of land, mostly but not entirely for grazing cattle and sheep to fill the aforesaid booming populations beyond the mountains. But that's not all of the demand, by any means, which those who are hired by Uncle Sam to manage this domain are urged to satisfy. There's a new land rush going on. Keen developers are hunting hard for valuable deposits underneath the surface of much of that area we knew as the "great desert."

Opportunity seekers want to lease the mineral rights so that new and pressing needs can be met. In any hectic defense organization when the ordinary supply of raw materials is not enough to fill the bill, we are duty bound to glean and scrape and ferret out every nook of the public domain to secure the vital replacements.

THE surface use of these public lands is likewise in high demand because of the forage as well as the timber. Timber is especially scarce. In the course of the last war period, forestry experts tell us that enough wood was utilized by the armed forces for boxes, crates, packing materials, and camp construction to build anew the city of Chicago.

Folks far removed from these stretches of public domain often fail to see their importance or why Uncle Sam's land managers are always up against a keen game in acting as our trustees. We hear so many tall tales of the reckless waste and incompetent management of government property that we need to be instructed and reminded a bit relative to handling the affairs of the federal acreage.

In recent years about seven dollars in revenue has come to the federal treasury for every dollar spent in looking after the proper safeguarding of Uncle Sam's land. But this could easily lead to a pinch-penny philosophy, because it takes a good steady investment to improve these lands and oversee them, and a seven to one ratio might obscure the need to be alert and up-to-date in maintenance and operation of these land leases and other returns.

Employment of personnel is surely not the cost-eating end of the present guardianship on these lands, at any rate. The man power hired to do the job is spread very thin. The average local range boss has nearly 10 million acres to travel across and look after.

Let's take the grazing business first. It's been a rather bitter point of argument sometimes, but things are easing up some on that score. There are about 134 million acres of the public domain set up under 58 organized grazing districts. They are all managed under the Taylor grazing law. A few other stray particles which do not join and are mixed up with private tracts are handled separately under Section 15 of that same law, and hence are known as "Section 15" lands.

Now as a rule most of the Taylor grazing law lands are quite dry and unsuited to plowing and cropping. Their value does not lie so much in what each acre will produce as in the huge size and immensity of them. They were once the home of the buffalo, wild deer, and antelope, and it's the sum total of what these lands grow in fodder that counts. Fully 10 million head of livestock normally graze part of each season on them. Besides, several hundred thousand wild game get part of their subsistence from them. The startling thing to know is that while acre-income rates on these arid empires are low, the actual income per man whose livestock grazes them is about equal to the highest enjoyed by many major types of farming in the whole country.

Both the Taylor grazing tracts and the smaller and scattered Section 15 lands are managed by the Division of Range Management in the Department of the Interior. Some large areas of the national forests are handled by Forest Service. In general a policy of

decentralization of management has been the rule, making the man close to the problem more responsible for this stewardship.

THERE are urgent and often conflicting demands faced by the men whom Uncle Sam entrusts with his wild domain. Even in the face of price controls and perhaps rationing, the meat makers of the big ranges who furnish the stock for others to fatten are going to be insistent seekers after grazing rights. This points to a need on the part of the land bosses to check carefully on grass capacity over these ranges and avoid over-stocking them with the bad results sure to come for users and the land itself.

Replanting and productive improvement of this grazing land are foremost issues. In a broad way the management and the improvement under the law are vested partly in regional and state advisory committees. These committees meet at intervals, size up conditions, and make official recommendations. Lately, by a large majority of votes in the advisory bodies, a new grazing rate schedule was adopted—some of the income to be spent in improvement for mutual benefit.

As endorsed by majority of the district boards, the fees charged after May 1, 1951, for grazing these lands will be increased from six cents to ten cents per animal unit per month. In addition to this, the currently charged range improvement fee of two cents per animal unit month remains the same.

Besides mineral and gas leases, the problem of the land managers is complicated by major withdrawals of public lands for national defense. Just recently the Atomic Energy Commission got 400,000 acres for experimental tests in Idaho's Lost River district. Most of the arrangements for the withdrawal were made by local rangers.

While we are on this subject of adding to and taking from the land holdings by Uncle Sam, a glance at the facts as they were just before and since World War II may be enlightening. Before the start of the war, about 1,505,000 acres were owned by the War Department. They were used for camps, air fields, bombing and artillery ranges, and for ordnance plants and depots. At the same time the Navy owned 480,000 acres.

During the four war years the Army bought 5,726,870 acres and the Navy acquired about 1,017,000 acres. That wasn't all. The government agencies entered into agreements with other owners. They leased private land and borrowed some from state and local governments. The total thus obtained was 10,285,000 acres. Hence by the end of the war about 20 million acres were under control of the Army and Navy for war uses. Moreover, the services also temporarily secured 33 million more acres from other branches of the federal government and various departments, some of them from the

(*Turn to page* 48)

The Land-use-pattern Scale[1]

By Otis T. Osgood

Agricultural Economics Department, Mississippi State College, State College, Mississippi

AGRICULTURAL workers generally have recognized that adapted farming practices and results from the different practices are associated with soils. Some have recognized that certain of the soils are associated geographically with certain other soils in what they have referred to as soil-association areas or soils areas. A few of these workers have even observed that there is an order, a rather high degree of uniformity, in the way some of the soils are associated with others to form a soil pattern. Yet, all attempts at obtaining specific results with reference to soils and making similarly specific recommendations for their use and management have been confronted with two major problems: (1) The *wide variation* in broad groups such as soil associations; and (2) the *large number* of most meaningful groups such as soil conditions.[2]

The result has been that recommendations for a broad area often include a range, as in rates of application of materials for a given crop, with little or no indication of which end of the range might be more nearly applicable to a given soil on any particular farm. Similarly, results from cultural practice tests, for example different planting dates and spacing rates for corn, may be reported only in terms of yields, often with nothing more than the name of a station or a statement of the general area to indicate the situation in which the results were obtained. Further, many land-use and farm-management studies have been made and reported with the direct or implied suggestion that findings on the most successful farms could be duplicated with similar results on other farms of the general area, even though it was known that soils in the area vary widely.

As an approach to being more specific as to soils in spite of the large number of soil conditions, and as a means toward developing a principle or guide for determining adapted practices, a most involved question appears to be in order: Is it possible within a soils and type-of-farming area to develop a system of classification of soil conditions that will permit rather specific answers to questions on adapted uses and management practices, the answers varying directly with place of the soil condition in the classification?

A positive answer to this question would mean that the system would be so designed that definite and reasonably uniform patterns in land use, yields, relative yields, production potentials, and adapted management practices run through it. A positive answer would also mean that it should be possible to group or classify farms on the basis of the proportion of their soils that are in any particular part of the classification, i.e., in any section of the soil pattern on which the classification is based.

It is the thesis of this statement that such a development is not only possible but that results from first efforts at solution of the many problems involved are most encouraging.

---

[1] For a more complete statement, see "The Land-use Pattern Scale Method of Land and Farm Classification," by the same author, Mississippi Experiment Station Bulletin.

The project, in which developments reported in this statement were made in the Mississippi Experiment Station, is in cooperation with the Mississippi Extension Service and the Tennessee Valley Authority.

[2] The term "soil condition," as used in this statement, refers to the mapping unit in soil survey, a combination of soil type, slope, and degree of erosion, as Atwood fine sandy loam C slope 2 erosion.

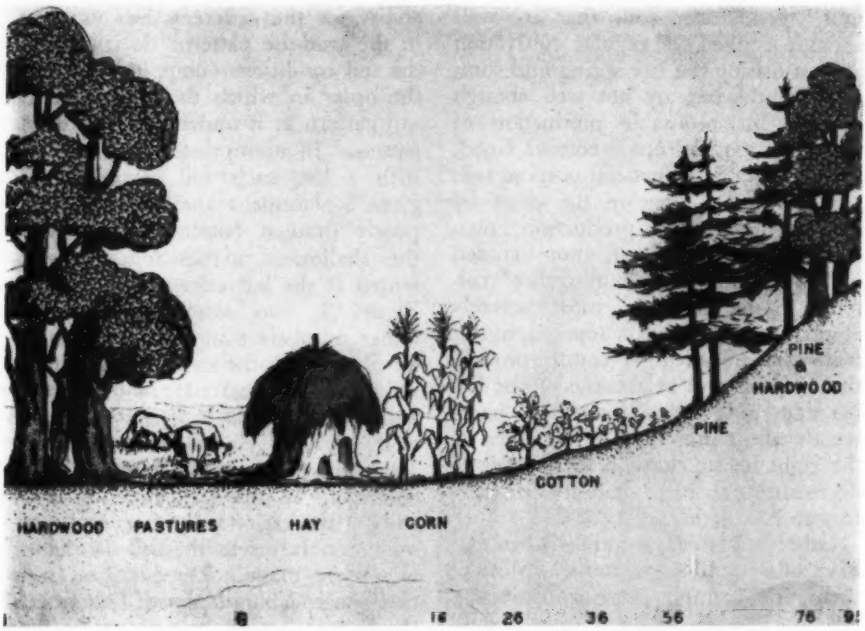


Fig. 1. Land-Use Pattern of Upper Coastal Plain Soils. The most poorly drained soils of the area tend to remain in hardwood timber production; soils with slightly better drainage are used for pastures; those with drainage suitable for a minimum of cultivation tend to be used for production of hay; soils that are well enough drained for regular cultivation but still too wet for good cotton land tend to be used for corn; well to excessively drained cropland soils, including the dry sandy hillsides, are used for production of cotton; and soils that are severely eroded, rugged in topography, or otherwise unprofitable for continued cultivation tend to return to or remain in pines and mixed-pine-hardwood timber production. (The numerals at the bottom of the chart are soil-condition-placement numbers.)

It is obvious that stability required in such a question as suggested would require that the classification be based on natural features that are physical determinants of suitable uses, relative yields, and adapted management practices. Indications of how these factors influence land use and production can be seen in tendencies of farm operators in a soils and type-of-farming area to use similar soils for similar purposes. This tendency, based on trial-and-error experience over the years and seen in relation to its physical determinants, may provide a framework for such a basic interpretive natural classification.

The sandy Upper Coastal Plain soils of the Tennessee Valley area of northeastern Mississippi were selected as the laboratory area for attempts at developing a method for classifying farms into groups within which farms would have a reasonable degree of uniformity as to adapted land uses and management practices. Figure 1 shows the land-use pattern of the area which reflects the underlying soil pattern, including drainage, elevation, topography, depth of topsoil, and degree of soil erosion.[3] In this chart the most poorly drained soils are represented at the extreme left, as indicated by the bottomland hardwood timber production. The slightly better drained soils, most of which are suitable for only a minimum of cultivation during the drier parts of the year, are represented in the area labeled "pasture" and "hay." Next in order in the land-use-pattern arrangement for this area are the "corn

[3] The land-use pattern sets out the uses to which the various soils tend to be put in current farm practices in an area. To those who are familiar with requirements for these uses, it also indicates other uses that would be adapted to soils underlying some of these uses.

soils," good, deep soils that are well enough drained for regular cultivation at least during the late spring and summer months but are not well enough drained for profitable production of such deep-rooted crops as cotton. Good, deep, well-drained, general-purpose soils are represented next in the chart by the heaviest cotton production; then the excessively drained, more eroded soils by the smaller "bumble-bee" cotton. Soils that are most severely eroded, most rugged in topography, or otherwise unsuited to cotton production and tend to be returned to or left in pines and mixed pines and hardwoods are represented still farther to the right in the chart in their order of decreasing relative suitability for pine timber production.

Other soil-association areas, of course, have other land-use patterns. Most of them, for example, have some eroded "pasture" soils between the upland "crop" and upland "forest" soils, that is, soils that are no longer profitable for production of field crops but that would still give a higher net return from pasture uses than from forest production.

The land-use-pattern scale is a systematic arrangement of the soil conditions according to their relative suitability for the different uses indicated in the land-use pattern. It is a list of the soil conditions (mapping units) in the order in which they occur in the soil pattern as it underlies the land-use pattern. In attempting arrangement of such a list, each soil condition was given a placement number. The most poorly drained bottomland soil with the shallowest usable topsoil, represented at the left edge of the chart in Figure 1, was assigned number 1. Other numbers assigned ranged up to number 95 for the most eroded upland soil with the most rugged topography and practically no topsoil, represented at the right edge of the chart in Figure 1. In the placement of the various soil conditions in the scale, studies of results of the various land uses and treatments on farms in the soil association area were made. These studies were made in collaboration with soils technicians, agronomists, county agents, and others working with the soils.

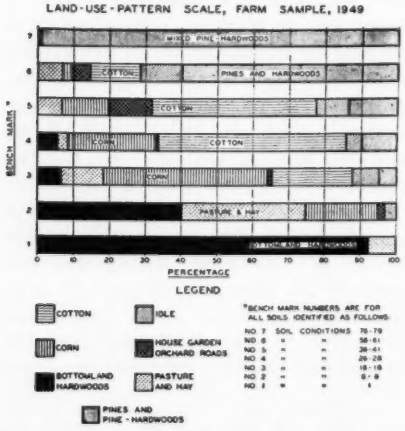


Fig. 2. Land uses shifted rather gradually and uniformly through the different points in the land-use-pattern scale.

For testing the land-use-pattern scale as a method of land classification and as a basis for classification of farms, a representative cross-section sample of farms was drawn from Production and Marketing Administration aerial photographs. Detailed soils maps of the farms were made on copies of the aerial photographs. The soil pattern, the land-use pattern, and production on these farms were studied. The 95 soil conditions identified in the area were grouped into 35 segments varying from one soil condition per segment for the first five segments, represented at the left of the chart in Figure 1, to four soil conditions per segment for the last 15 segments represented at the right of the chart. A sample of soils within the sample of farms was then drawn by starting at random and taking every fifth segment or group of soil conditions along the scale as indicated by the location of the various soil-condition numbers along the bottom of the chart in Figure 1. Soil conditions drawn in these sample segments were called "benchmark soils." Production per

acre, as well as land use, was recorded for all these soils as found on the sample farms. These data served as a beginning for establishment of "benchmarks" along a continuous scale, points between which interpolations could be made for other parts of the "land-use-pattern" scale.

The areas for all the soil conditions at the various benchmarks were plani-metered and the total acreage figures distributed among the uses to which they were put in 1949. The distributions of land uses at the various sample or benchmark points are set out on a percentage basis in Figure 2.

Tendencies in land use for the various kinds of soils in the area for which this report is made are set out in Figure 1. The strength of these tendencies at the points indicated by the soil-condition-placement numbers along the bottom of the chart is indicated by the corresponding 100 per cent bars in Figure 2. It will be observed that the benchmark numbers in Figure 2 correspond to the points indicated by the various soil-condition numbers along the bottom of the chart in Figure 1.

YIELDS OF CORN, AND VALUE ABOVE FERTILIZER COSTS, BY TREATMENTS, FOUR SPECIAL STUDY RESEARCH FARMS, TWO REPLICATIONS. BENCHMARKS NO.3 AND NO.5, UPPER COASTAL PLAIN SOILS, ALCORN, PRENTISS, AND TISHOMINGO COUNTIES, MISSISSIPPI, 1950.

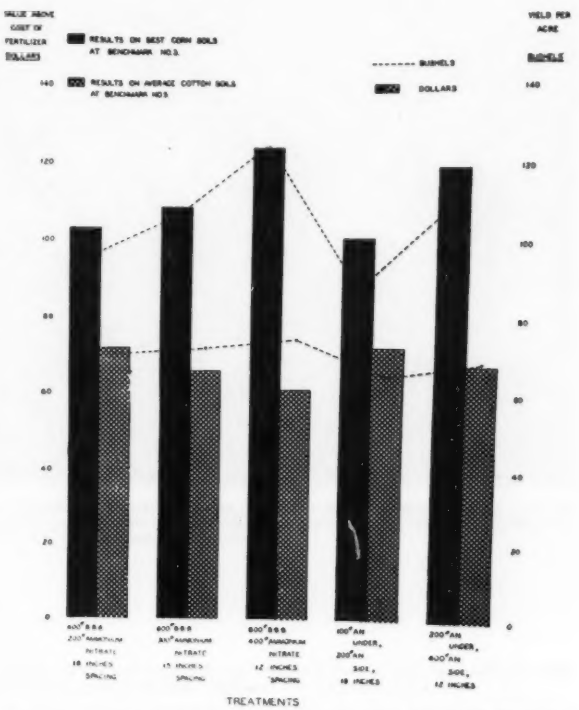
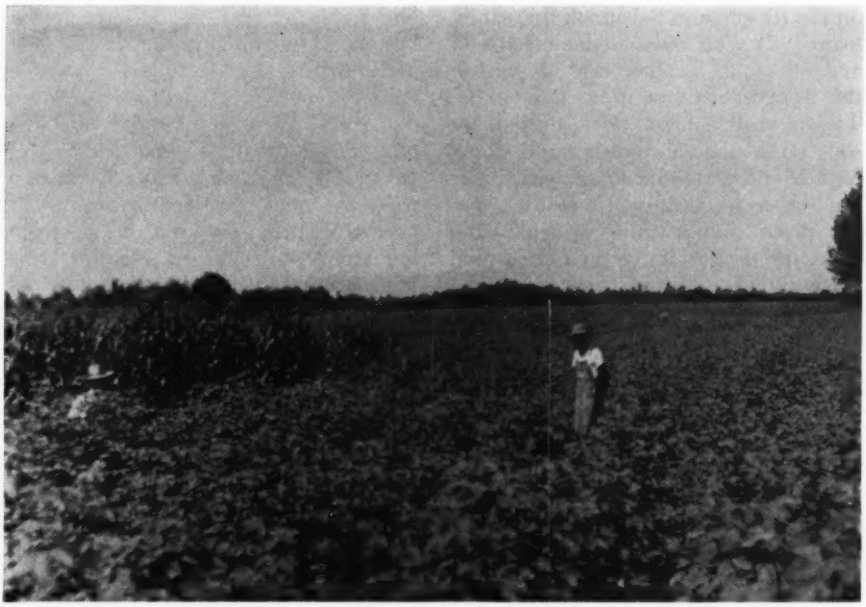


Fig. 3. Heavy fertilization and thick spacing of corn paid best on the best corn soils at benchmark No. 3, while less fertilizer and thinner spacing paid better on the less productive soils at benchmark No. 5.

As illustrated in Figure 2, land uses shifted rather gradually through the different benchmark points from about 92 per cent in bottomland hardwoods on the Bibb silt loam soils at benchmark No. 1 to about 99 per cent in mixed pines and hardwoods on the most rugged Guin, Guthbert, and Shubuta soils at benchmark No. 7. At benchmark No. 2, on the Stough soils, the bottomland hardwoods occupied less than one-half as high a proportion of the land as at benchmark No. 1, while the proportion in pasture and hay uses was more than four times as great. Some corn was also grown on these soils. At benchmark No. 3, more than 40 per cent of the uneroded Prentiss silt loam soils and others with similar use-suitabilities were used for corn production, and some cotton was grown. At benchmark No. 4, three-fourths of the better drained Prentiss fine sandy loam soils with only moderate erosion and less than five per cent slopes, along with other soils with similar use-suitabilities, were used for cotton and corn. At benchmark No. 5,

Above: **100 bushels of corn per acre as contrasted to a State average of about 24 bushels is a reasonable goal for the uneroded, moderately drained Iuka, Jamison, and Prentiss soils centering around benchmark No. 3.**

Below: **The best permanent pastures on the Upper Coastal Plain soils are on the poorly drained Bibb, Stough, and Guntown soils centering around benchmark No. 2.**



Above: **90 to 100 bushels of corn and considerably more than a bale of cotton per acre are possible on the good, well-drained, Ducker, Tilden, and Atwood soils centering around benchmark No. 4.**

Below: **Production was poor for cotton and good for pines on the severely eroded Ruston and Ora soils at benchmark No. 6.**

on the Ruston and Savannah fine sandy loam soils with only moderate erosion and less than five per cent slopes, on the best of the Ora soils, and on the Tilden and Cahaba fine sandy loam soils with moderate erosion and slopes of 5 to 12 per cent, along with other soils with similar use-suitabilities, cotton production was the principal use. Also, the proportion of these soils used for buildings, gardens, truck crops, and orchards was much greater than at any other point in the scale. In fact, the concentration of farm homes on these soils was so great as to remind one of the concentration in location of old Indian campsites of the area on the well-drained Cahaba soils near the streams. At benchmark No. 6, on Ruston soils with three-fourths or more of the topsoil gone or with slopes of more than 12 per cent and on Shubuta soils with slightly less erosion and slopes and on other soils with similar use-suitabilities, production possibilities, and erosion-control problems, about two-thirds of the land was either in pines and pines and hardwoods or idle or pastured in the process of returning to these woodland uses. The only crop attempted to any extent on these soils was cotton. About 99 per cent of the Ruston, Cuthbert, and Shubuta soils with their red clay subsoils at benchmark No. 7, near the rugged end of the scale, were in pines and mixed pines and hardwood uses. Yet, it was another land use at this point in the scale that illustrated the extreme to which people of the area go in their tendency toward use of similar soils for similar purposes. All cemeteries were located here.

In the forest areas of the sample, patterns in forest type and stocking condition ran through the various benchmark points just as definitely and uniformly as any of the other patterns. For example, the proportion of the forest area on which 66 to 100 per cent of the stands were pines was 6%, 14%, 63%, 33%, and 7% at the points represented by benchmarks No. 3, No. 4, No. 5, No. 6, and No. 7, respectively. For the same points in the scale, in the same order, the proportions of the stands for which foresters gave a rating of "good" for condition of stocking, the corresponding figures were 5%, 16%, 39% 25%, and 5%. These two paterns could be approximated by normal distribution curves rising from low points at benchmark No. 3 to their highest points at benchmark No. 5 and returning to similarly low points at benchmark No. 7.

Table I shows yields and relative yields and production for the two major field crops of the area, corn and cotton, at the benchmark points over which both crops are grown. Figures in the column showing relative yields, pounds of lint cotton per bushel of corn, indicate reasons for the land-use tendencies illustrated in Figure 1. Figures for relative production, in the last column at the right of the table, show results of these yields and tendencies.

The patterns in productive capacities of these soils appear to correspond closely to the patterns in yields set out in Table 1. Results to date indicate that soils at benchmark No. 4 for cotton and No. 3 for corn may be able to use profitably more than twice as heavy applications of commercial fertilizers as those at benchmark No. 6. As to relative proportions of fertilizer materials in relation to the land-use-pattern scale, substantial increases in cotton production from relatively high proportions of nitrogen have been obtained at benchmark No. 6, while decreases have been obtained from application of the same relatively high proportions of nitrogen at benchmark No. 3. Preliminary results indicate that the pattern for response to relatively high proportions of potash may run in the opposite direction along the scale.

Further information on both productive capacity and proportions of materials for the benchmark points was obtained during the 1950 crop-year by

(*Turn to page* 40)

Fig. 1. A general view of the J. B. Abbott Farm in Rockingham, near Bellows Falls, Vermont.

Grassland Farming Brings New Management Problems

By John B. Abbott

Bellows Falls, Vermont

THE Corn Belt farmer who decides to change over to grassland farming may be making a very wise move but he will find that he has some new problems to solve.

The first problem is to decide what meadow crops to grow. That, of course, is a local problem but in so far as practicable the meadow crop should be a mixture of grasses and perennial legumes—preferably brome or timothy with ladino clover for grazing and with alfalfa for winter feed.

The second problem, without doubt, is to decide what kind of livestock husbandry he is going to follow, since the meadow crops can not be marketed as such on any large scale. (Imagine trying to sell as hay all the hay which could be grown in Iowa or Illinois!) The meadow crops simply have to be transformed into livestock or livestock products in order to find a market.

The third problem is allocation of fertilizer among crops. It is generally conceded that, in the typical short rotation grain crop farming of the Corn Belt, it is more profitable to use most of the fertilizer for the grain crops and let the meadow crops, mainly clover, eat the leavings. This, however, is not the more profitable practice in long rotation grassland farming. The meadow crops need plant food just as much as the grain crops do in order to produce profitable yields. If they get it, all well and good. They will produce as many pounds of TDN per

acre as corn and more than any of the other grain crops. If they do not get it, the meadow crops of the first year may be fairly good, due to residues from the grain crop fertilizer. After that yields will very soon fall to an unprofitable level.

What fertilizer for the meadow crops? Soil deficiencies, of course, vary from region to region and even from farm to farm. In general, for the small grain nurse crop and the new seeded meadow crop with it, the story is this: Use a little nitrogen to start the seedling plants plus a liberal amount of such minerals as are deficient. In some instances phosphorus alone is enough. More frequently potash also is required. And lime should not be forgotten in case the soil is acid and the supply of calcium and magnesium not adequate. On my own farm a moderate application of dolomitic limestone plus a 4-12-16 fertilizer carrying 100 pounds of borax per ton at rate of 500 pounds per acre is about right.

In the typical Corn Belt short rotation with only one year of meadow crops, such fertilization for the small grain nurse crop and new seeding would be quite adequate. It is not adequate if you are going over to grassland farming and planning to leave the sod crop down for 6 or 8 years. You can not get the TDN equivalent of 75 to 100 bushels of corn from half-starved meadow crops.

What further fertilization does the meadow crop need? Again it is a local problem but, in general, an annual light topdressing in late fall or very early spring with such manure as is available plus such mineral fertilizers as are needed by the legumes will meet the needs of the meadow crop as long as legumes dominate the stand. When the legumes give way to grass, nitrogen also is needed. My own practice is to topdress the legumes with 0-20-20 at the rate of 500 pounds per acre and when the legumes give way to grass, as is bound to happen sooner or later, change over to 10-10-10 in an amount sufficient to supply at least 50 pounds of nitrogen per acre.

It is not a hard job—in fact, it is an easy one—to grow as many pounds of TDN per acre in a meadow crop long rotation as in a grain crop short rotation but it isn't an easy job—in fact, it is a hard one—to harvest the crop without impairing the stand of legumes or suffering a lot of waste.

Take pasture, for example. The cows need the same amount of feed every day all summer long. Pasture plants do not grow that way. They make about two-thirds of their growth in one-third of the season—May and June. How are you going to keep the lush grass of the May-June flush from smothering out the clover? How are you going to prevent waste of a considerable part of the May-June surplus? And how are you going to provide feed for the July-August shortage period?

There is a lot to be said for modern assembly-line, mass-production methods of making hay if the weather is perfect, which it frequently isn't. There is quite as much to be said against such methods when the hay curing weather is foul, as it sometimes is. The fact is, rain-leached, sun-bleached, defoliated stems or badly over-ripe hay contain, at best, little more than half the TDN originally contained in the crop. There is a lot more to the harvesting and curing process than merely achieving a high degree of mechanized efficiency.

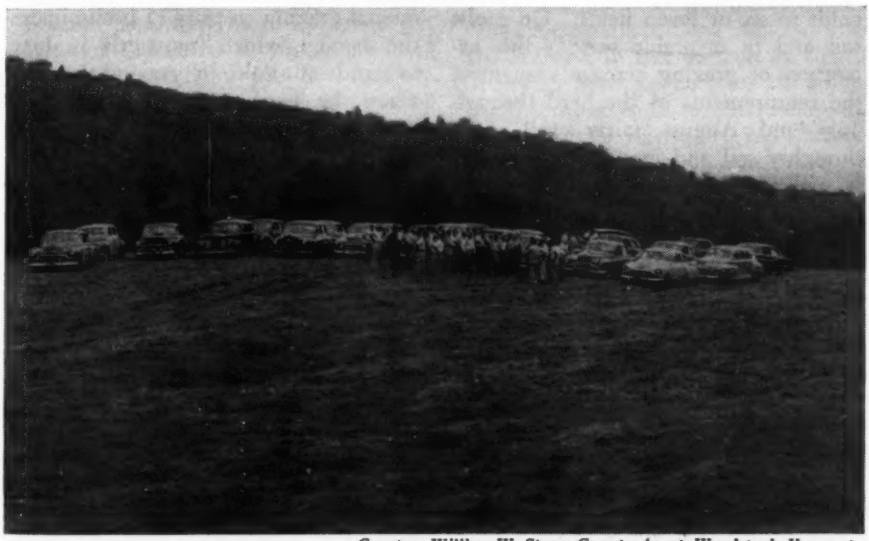
After more than 25 years of struggling with them, I seem to have these pasture and hay crop problems pretty well licked so far as this farm is concerned. The basic principles involved and the practices which I follow will, I think, apply to many other farms.

I have to deal with four land conditions: (1) smooth, non-erosive, readily arable fields which can be farmed in a short rotation if it seems desirable; (2) sloping, somewhat erosive, less readily arable fields which should remain in sod most of the time but which can be plowed and reseeded when renovation of the sod becomes necessary;

Fig. 2. With insufficient application of mineral fertilizers, legumes in hay and pasture stands are difficult to maintain. In this field, alfalfa has disappeared except on the strips which had received a topdressing of wood ashes in addition to the usual fertilizers. The extra calcium, magnesium, potash, and boron in the ashes made the difference.

(3) more steeply sloping, erosive fields which would wash badly if plowed and which are not suitable for mechanized agriculture anyway but which can be fertilized mechanically and clipped with the mowing machine to control weeds; and (4) land suitable only for forest.

Quite obviously (1) tends to a shorter, row-crop rotation; (2) tends to a longer, meadow-crop rotation; (3) tends to really permanent pasture, although some of it has to be smoothed up with a bulldozer first; and (4) to



Courtesy William W. Stone, County Agent, Woodstock, Vermont

Fig. 3. Industry salesmen, agronomists, and representatives of the farm press viewing a well-fertilized, well-managed pasture on the John B. Abbott farm.

forest, natural or planted.

At best, in this latitude we can expect no more than six months of grazing and not all of that good, so at the outset I plan on some 60 per cent of my usable acreage for grazing and 40 per cent for winter feed. Experience has shown that it is easier to manage pasture right if the pasture is divided into several lots to permit rotational grazing. Mine happens to be divided into seven separate enclosures. Probably five could be made to serve about equally well.

With this set up I can solve the May-June grazing surplus problem by grazing only three or four of the seven enclosures—the rougher ones, of course —and harvesting the crop on the others. (As long as I tried to cure this early cut ladino-brome mixture for hay I had little success but ensiling it solved that problem.) Native pastures, of course, wouldn't produce much grass silage. Well-fertilized ladino-brome is good for five to eight tons per acre, and barring a June drought the second crop is ready to graze by the first of July.

This plan permits expanding the acreage available for grazing at the end of the normal flush season from three fields to six or seven fields. On moist soil and in favorable seasons this expansion of grazing acreage may meet the requirements of the herd through July and August fairly well. On droughty soil and in droughty seasons it will not, in which case it may be desirable to graze second crop in some of the hay fields or to feed out some of the grass silage. On the basis of such experience as I have had, I prefer feeding the grass silage to grazing the fields, as such grazing does a stand of alfalfa no good at all. Besides, I need that second crop for winter feed.

That midsummer feed problem seems to boil down to this: The seasonal growth habits of grass and clover being what they are, it is swimming *against* the tide to try to produce grazing for current needs in July and August but *with* the tide to produce a considerable excess of it in May and June. So I grow all I can in May and June when I can grow it most efficiently. I am virtually forced to ensile part of this May-June flush because I can't cure it for hay in the average season without serious impairment of quality and a lot of expense, and I certainly can not afford to waste it.

And while I am about the job of ensiling part of this May-June flush from the pasture fields, I go right ahead and finish filling a couple of silos from some of the hay fields. That practice solves several grassland management problems. (1) It saves the surplus feed from the May-June flush. (2) It gets the grass off before it smothers the ladino. (3) It permits harvesting, curing, and storing first-cutting alfalfa-grass and clover-grass mixtures on time without weather damage or other impairment of quality—something which I seldom succeeded in doing when I tried to field-cure the hay. (4) It gets the first crop off the land in time to give the second crop a good start. (5) It provides a supply of first-class feed to carry the herd through the probable summer drought. (6) It eliminates the bother and cost of growing supplemental grazing crops. (7) It eliminates the damage which frequently is done to stands of alfalfa by grazing the crop when the herd needs it rather than when the crop can stand it.

Handling the meadow crops in this way costs a lot of money but it saves a lot of money too. It saves the entire cost of haying the first crop. It eliminates the risk of weather damage to the first crop which, in some years with rainy June weather, has been several hundred dollars even on this small farm. It saves stands of ladino which likely would be smothered out or at least badly damaged if the associated grass is allowed to overtop it for too long. And by supplying silage of very superior quality, it maintains milk production at a high level with only moderate grain feeding.

Kay-two-oh in California

By George P. Gray

Oakland, California

POTASH, otherwise known as kay-two-oh, is the aristocrat of the plant-food triumvirate. It is rated the highest for quality production. Quality is made up of many factors and each must be measured to evaluate quality differences. When quantity production is being studied, only yield needs to be measured. The more laborious procedure, of observing quality may be one of the reasons why information on the need for potash has been slow to develop. Some soils in the semi-arid regions contain enough available potash to sustain plant growth without evident symptoms of serious deficiency, yet will respond to applications of potash. If no increase in production is noted, the quality of the crop, not being easily measured, may be entirely overlooked.

Extensive study by the California Agricultural Experiment Station in cooperation with the American Potash Institute is finding more and more soil areas of California in which the level of potash availability is too low to allow maximum production of top-quality crops. Constantly improved techniques of foliar diagnosis, that is, leaf analysis, have been most helpful in disclosing any shortage of potash in the tissues of growing plants. This method of study accounts, in a large measure, for the increasing number of locations where inclusion of potash in the fertilizer program has been found to be a paying proposition both in yield and in quality. The rapid chemical methods of estimating potash availability in soils have been helpful, too, especially in extreme cases. They, however, lack the precision of leaf analysis.

It has been estimated, for the United States as a whole, that the removal of potash by harvesting crops exceeds the quantity returned in fertilizers by 55 per cent. If this condition prevails in California, then sooner or later, the original store of potash in our soils will be depleted to the point where potash must be applied to most crops in order to insure maximum yields. Data on a mass of soil samples from Southern California, south of Fresno, collected and analyzed by the Growers Advisory Service of a fertilizer concern, showed that about 20 per cent of the soils collected were decidedly low in potassium.

Response to Potash

At the second annual Prune Day held in October 1949 on the campus of the College of Agriculture, Davis, California, Professor E. L. Proebsting told of the results of fertilizer experiments on prunes carried on for five years in Sutter County. It was reported that while nitrogen additions failed to show any increase in size of fruit or change in drying ratio, prune trees are among the first to respond to potassium. He pointed out, however, that returns from application to trees which have not shown deficiency symptoms were not profitable.

In an article, "Leaf Analysis," published in this magazine December 1944, M. E. McCollam cites an instance of the successful use of leaf analysis on the 3,000-acre ranch of the California Packing Corporation near Merced, California. He quotes from a report by P. D. Caldis, A. R. Brown, and R. T. Marks of that organization. Highlights of this report are as follows: Comparative leaf analyses were made yearly since 1937 in this and neighboring orchards. The potassium content

of the leaves of the Cal-Pack ranch was found to be low, 0.87 to 2.73 per cent, while better yielding and sizing orchards in neighboring counties, but on different soil types, analyzed 2.72 and 5.19 per cent. It was stated that the trees in the Cal-Pack orchard, fertilized adequately with nitrogen, appeared normal in many respects and that no symptoms of potash deficiency could be observed.

Fairly large applications of potassium and phosphorus, 900 pounds per acre each, showed no response. A wholesale dose of 4,000 pounds per acre was then put on in one application. It was found that this drastic treatment gradually increased the K_2O content of the leaves from 0.87 per cent to 2.53 per cent at the end of the fourth year without further application of potash. The mean diameter of the fruit was increased by 2 mm., and the yield was increased 4.8 tons per acre.

Experiments by the California Agricultural Experiment Station, as well as by commercial interests, are in agreement about the value of potash in the fertilization of ladino clover on certain soils in the interior valleys. The best three-horse team for this purpose appears to be phosphate, potash, and lime with a little touch of a nitrogen whip, especially for new seedings of clover and grasses. An occasional touch of the whip may be needed on old stands to stimulate the growth of grass. An application of 1,000 pounds of lime per acre, enough to last two or three years, has been recommended together with 200 pounds each per acre, annually, of superphosphate and potash, either the muriate or sulphate.

Trials at Oakdale, California, have shown that the yield of ladino clover fertilized with the phosphate-potash combination was double that of the unfertilized crop. Phosphate alone was beneficial but the yield in this case was 1.6 times that of the unfertilized instead of 2.2 times as in the case of the combination treatment. Similar, but less spectacular, increases were obtained on more naturally fertile soil at Galt, California. The benefit here from phosphate-potash fertilization was considerably bettered by the use of lime.

Leaf scorch and die-back in prune, peach, and almond orchards, as well as in olive groves, seemingly caused by serious potassium deficiency, are being intensively studied by Dr. O. Lilleland and by J. G. Brown of the University of California. Potash is now being recommended in Butte County almond orchards and olive groves on the basis of potash-deficiency symptoms on the trees. Extensive use of leaf analysis technique is being made by Dr. A. Ulrich, also of the University of California, in the study of the nutrition of grapes, clover, sugar beets, and tomatoes.

It is anticipated that the results of all this experimental activity will be made public in the near future and that, as a result, potash will be placed higher up on the list of the requirements of California crops for greatest production and highest quality.

Definitions

The terminology of the various compounds of potassium is somewhat confusing. Names used by chemists, fertilizer manufacturers, and by the early operators for the recovery of the values in wood ashes have all crept into our language. Some clarification of the terms appears to be in order.

Potassium (K) is the proper designation of the element itself. The chemical symbol is "K" from the Arabic "Kalium." This metallic element is a soft, silvery substance, lighter than water, very active chemically, and so it is never found free in nature.

Potash: This name has an ancient origin. Originally it was applied to the product derived from leaching wood ashes with water in huge iron pots, hence the word "pot-ash." Strictly speaking, the word should refer to potassium carbonate only, the product so recovered. In later years, however, the name, potash, came to be applied

as a generic term to most any compound of potassium whether it be oxide, sulphate, chloride, nitrate, etc.

Kay-two-oh (K_2O): The percentage of potassium in all articles of commerce, in fertilizer materials, and in mixed fertilizers is always stated in terms of the equivalent of potassium oxide (K_2O) rather than in percentage of the element, even though the oxide is not present as such. In this way the various commodities are rated based upon a common denominator. The chemical symbol, K_2O, signifies that two atoms of potassium (K) are in combination with one atom of oxygen (O).

Potassium Chloride (KCl): When potassium is chemically combined with the element chlorine (Cl), the compound is called potassium chloride by the chemist and called muriate of potash by the trade. ("Muriate" is from muriatic acid, the trade name for hydrochloric acid, HCl.) This salt enjoys the greatest use as a fertilizer.

Potassium Sulphate (K_2SO_4): This is the correct chemical term when two atoms of potassium are chemically combined with one atom of sulphur and four atoms of oxygen, the sulphate radical (SO_4). It can be made by treating potassium chloride with sulphuric acid (H_2SO_4). Hydrochloric acid (HCl) is expelled as a vapor and the sulphate remains behind as a residue. At Searles Lake, Trona, California, the sulphate is made by the double decomposition of the chloride and sodium sulphate.

Increased Consumption in California

Data compiled by the Bureau of Chemistry, California Department of Agriculture, testify to the steadily increasing interest and use of potash by the State's farmers. The Bureau has estimated, by year, the approximate total tonnage of nitrogen, phosphoric acid, and potash sold in the State. The 1948 estimated consumption of potash, 13,810 tons, was 2.4 times that of 1938 which was 5,720 tons. These figures included the potash marketed in mixed fertilizers and the potash salts sold as such. As might be expected, this increase closely parallels that of the total tonnage of all fertilizers sold. Potash is included in the majority of mixed fertilizers.

Of greater significance, however, are the reports of segregated tonnage sales filed quarterly with the Bureau. In this tabulation we find that 6,535 tons of potash salts, both muriate and sulphate, were sold for direct application during 1948. The reported sales for 1938 were 1,828 tons. This is to say that the use of straight potash fertilization has increased more than 3.5 times in 10 years.

Muriate or Sulphate?

A recent and very definite trend in California toward a greater use of muriate is indicated by the Bureau's estimates and segregated tonnage reports. Until 1948 much greater preference was shown for the sulphate than for the muriate. In 1947 the sulphate out-sold the muriate better than two to one. But one year later, 1948, more than half of the tonnage reported was the muriate. Reducing the figures to K_2O equivalents for a better comparison, it is found that about 2,000 tons of K_2O were derived from muriate in 1948 against only 1,600 tons from the sulphate.

There should be some agronomic consideration given to the distribution of the two forms of potash in California. We have some situations where the chloride, already in the soil, limits plant growth at times. In these situations the sulphate of potash would be the most desirable form to use. As massive applications of potash come to be used to correct cases of serious deficiency, much more care must be exercised in applying the chloride this way. Heavy sulphate of potash applications on the other hand have rarely caused trouble. On soils which have a very high sulphate content, the muriate of potash might be the preferable one to use.

Potash exists in the form of the

chloride in the high-grade sylvinite deposits being worked in New Mexico and in the brine of Searles Lake, California. Obviously, the purified chloride salt can be sold, and is sold, at a lower price than is the case when additional processes are used to convert the chloride to the sulphate. The price per ton is not only less but this salt contains 10 per cent more potash than the sulphate.

Potash Deposits of the West

Agriculture and industry were brought up with a jerk when the first world war completely cut off imports of potash from Germany. Previous to 1914 the United States had been entirely dependent upon imports to supply the needs of agriculture and industry. When imports were stopped by the war, what little potash was obtainable was quoted as high as 10 times the pre-war price of about $35 per ton for 50 per cent muriate. California users were asked as much as 30 cents a pound, or $600 per ton for the preferred sulphate.

Of the many potash plants operating in 1918, the only major domestic producer to survive the World War I period was the American Trona Corporation operating on the brines of Searles Lake, Trona, California. This firm, now known as the American Potash and Chemical Corporation, has developed into one of the finest chemical plants in the country. They are operating on an area of about 12 square miles of a layer of crystallized salts 50 to 75 feet thick on the bottom of a partly-evaporated lake in the Mojave Desert. Intermingled in this crust of crystals is found a mineral-rich brine containing such salts as potassium chloride, sodium chloride, sodium sulphate, sodium carbonate, and borax.

Following the first world war, a small group of Congressmen and government scientists did not feel the general discouragement and pessimism about finding a domestic source of potash. They succeeded in persuading Congress to appropriate money for exploration of the promising areas of western Texas and southwestern New Mexico. It was hoped that deposits would be found similar to the enormous Stassfurt deposits of Germany which heretofore had supplied the world's hunger for potash.

The so-called Permian Basin in the southwest section of the United States and extending northward as far as Kansas was known to have large deposits of salt buried under hundreds of feet of soil. According to geologists, these deposits had been laid down by the evaporation of sea water during the Permian era and were covered by soil erosion of following geologic ages. It seemed reasonable to hope that intensive exploration would disclose strata in which potash salts had crystallized out in sufficient concentration for exploitation.

Core drilling made possible by Federal appropriation, while disappointing, disclosed a wide area in which potash minerals occurred but in too small amounts for practical recovery. The big strike was made near the city of Carlsbad, New Mexico, by the Snowden and McSweeney Company when drilling for oil. Thick beds of high-grade, water-soluble potash minerals were encountered at a depth of 1,000 feet below the surface. The oil-drillers were reorganized as the United States Potash Company in 1926, started mining operations, and constructed a refinery. Mining and refining operations were started in 1931 and 1940 by two more companies, the Potash Company of America and the Union Potash Company later taken over by the International Minerals and Chemical Corporation.

The deposit being mined in New Mexico is a mixture of sodium chloride and potassium chloride known as sylvinite. It lies in horizontal strata 6 to 12 feet thick and averaging around 25 per cent K_2O.

As a result of all this development,

(*Turn to page* 44)

Soil Treatment Improves Soybeans

By H. J. Snider

Agronomy Department, University of Illinois, Urbana, Illinois

SOYBEANS like many other farm crops are used mainly for food and feed. Oil, the part generally used for food, makes up approximately 20 per cent of the bean; and protein, the part used for feed, about 40 per cent. Since oil and protein are the commercial constituents in soybeans, it is only logical that they are given consideration in selecting and recommending varieties to be grown. However, acre yield is given first consideration in determining the desirability of a variety. A few bushels increase in yield will more than compensate for fractional shortage in oil or protein.

The U. S. Regional Soybean Laboratory emphasizes nine factors in presenting comparisons of various varieties which are grown throughout the north-central states region. This Federal Laboratory works with the experiment stations in the region and through this cooperative effort new varieties are originated, developed, and disseminated. The factors used in comparing varieties are: acre yield, maturity, lodging, height in inches, seed quality, seed weight, percentage protein, percentage oil, and the iodine number of the oil. A variety may be found lacking in some of these factors and still retain a place among those recommended for the region. If it is too deficient in acre yield, it will be discarded regardless of a high rating in other qualities.

Soybean growers are interested in high acre yield because income is directly influenced by this factor. Growers may also be interested more or less in the other factors which make a variety acceptable. They may not care to grow a variety which may lodge badly, is too tall or too short, one that matures too early or too late, or one which will be discriminated against on the market because of low percentages of oil or protein.

Processors want the highest possible oil and protein content that can be had in soybeans. They probably have the full right to expect beans of high oil and high protein content. If the desire for high percentage oil is too insistent, it may work a hardship on both the grower and the processor. It sometimes happens that high oil content is associated with low acre yield which means less total oil and also less protein.

Effect of Potash

Soil condition influences acre yield as well as oil and protein content of soybeans. The fact that potassium treatment has a tendency to increase the oil content of soybeans was illustrated on the Willow Hill field shown in Table I. On land without potassium treatment (LsPN), the percentage oil was 17.9. Where 50 pounds of muriate of potash were added, the percentage of oil went up to 18.9 and increased with each increment of potassium up to 19.8 where 300 pounds of muriate of potash were added to the soil. The acre yield of oil also increased from 225 pounds where no potassium was used and went up to 404 pounds where the 300 pounds of muriate were added. The acre yield of beans also increased from 21 bushels up to 34. These are substantial increases both in bushels and percentage oil. However, 140 pounds of the acre

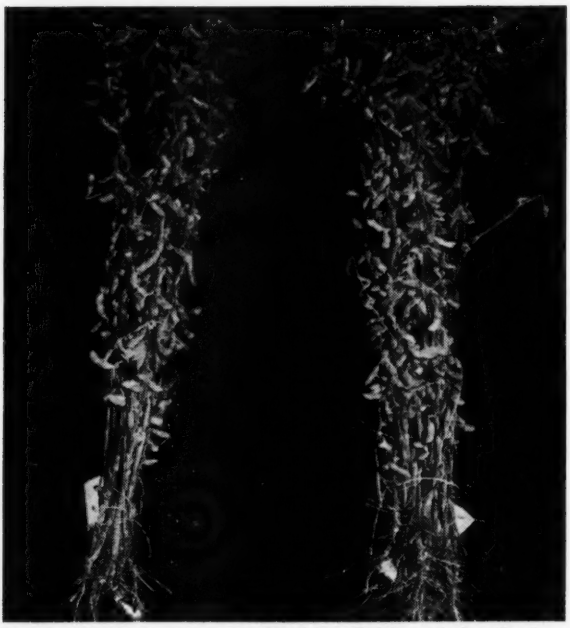


Fig. 1. Soybeans grown on the Joliet Field, each bundle from 8 sq. ft.

	No treatment	Treated R L rP K
Bu. acre	24	32
% oil	21.8	23.2
% protein	39.4	39.2
Lbs. oil	314	445
Lbs. protein	567	752

increase in oil were due to the increase in bushels and only 39 pounds were due to the percentage increase in oil because of the potassium treatment. The percentage protein went gradually down from 43.9 where no potassium was used to 39.0 where the 300 pounds of muriate of potash were added to the soil. On the other hand, the acre yield of protein increased from 553 pounds up to 796 pounds per acre due to the increase in the acre yield of beans. In this comparison the high acre yield and high percentage oil went along together while the percentage protein went down to 39, but the acre yield of each was greatly increased.

The Willow Hill plots were located on the light-colored soil of southern Illinois. This land is decidedly acid, deficient in organic matter, nitrogen, available phosphorus, and potassium.

On the Ewing experiment field, also representing the light-colored southern Illinois soils, the soybean yield on untreated land was relatively low, 10 bushels per acre. The oil content of the beans was also low, 20.6 per cent, and the protein content was extremely low, 33.8 per cent. Where an 0-10-20 fertilizer (1,000 pounds every four years) was added, the acre yield of beans was not increased, but the percentage oil was unusually high, 24.9 per cent, and the protein remained low.

TABLE I. OIL AND PROTEIN CONTENT OF SOYBEANS WITH ACRE YIELD. WILLOW HILL 1948, FARM OF C. E. UREFER REPRESENTING LIGHT-COLORED SOIL.

Soil treatment	Beans bu/A	Oil %	Protein %	Oil lbs.	Protein lbs.
Lime	20	18.9	41.4	227	497
LsPN	21	17.9	43.9	225	553
LsPNK 50 lbs.	29	18.9	41.5	329	722
LsPNK 100 lbs.	30	19.1	40.2	344	722
LsPNK 150 lbs.	32	19.2	39.5	369	758
LsPNK 300 lbs.	34	19.8	39.0	404	796

L—limestone; sP—superphosphate; N—ammonium sulphate; K—muriate of potash

On land which was limed and some of the organic matter was restored by crop residues (R L) and then the 0-10-20 fertilizer added, the bushels of beans increased nearly three times or up to 27 bushels. The oil and protein percentages were relatively high and the acre yields of oil and protein went up to substantial figures, (Table II).

On the Brownstown experiment field, (Table II), also a light-colored southern Illinois soil, the highest percentage of oil was in the beans on untreated land. Here also the unlimed land gave a low yield of beans and a low protein content. On this field the potassium treatment gave a substantial increase in soybeans but failed to give increase in percentage of oil.

On the Joliet and Carthage experiment fields, (Table III), representing dark-colored soils of a high productive

(*Turn to page* 47)

Fig. 2. Soybeans grown on the Ewing Field, each bundle from 8 sq. ft.

	No treatment	Treated R L 0-10-20
Bu. acre	10	27
% oil	20.6	22.7
% protein	33.8	41.2
Lbs. oil	124	368
Lbs. protein	203	667

TABLE II. OIL AND PROTEIN CONTENT OF SOYBEANS ALONG WITH ACRE YIELD. EWING AND BROWNSTOWN EXPERIMENT FIELDS, REPRESENTING LIGHT-COLORED SOILS.

Soil treatment	Beans bu/A	Oil %	Protein %	Oil lbs.	Protein lbs.
Ewing 1949					
None	10	20.6	33.8	124	203
0–10–20	9	24.9	35.4	134	191
RL 0–10–20	27	22.7	41.2	368	667
Brownstown 1949					
None	13	22.8	35.4	178	269
Lime	18	21.6	41.2	233	445
LK	25	21.8	37.9	327	569
LsP	20	22.0	41.5	264	498
LsPK	24	21.8	40.0	314	576
LrPK	27	22.0	39.5	365	656

R—crop residues; L—limestone; K—muriate of potash; sP—superphosphate; rP—rock phosphate

You Can't Be a "Compass" Farmer And Build Up Run-down Soil

By W. H. Lathrop

Milwaukee, Wisconsin

IF you're one of several million farmers who are trying to build up run-down land, talk to Edgar Wilson. You'll find him on a farm two miles east of Wingate in Montgomery County, Indiana. Here lush crops grow on once threadbare land that Edgar took over back in 1930. From ragged soil to the richest labor income per acre of any farmer in central Indiana, that's the amazing story of the Wilson farm.

Your talk with Wilson about building up soil will soon get around to "compass farming." That's his name for rows that run straight east and west or north and south with the compass. Soil conservation workers consider these compass rows a serious threat to the soil because on sloping land they are sure to run up hill. And that means a lot of water and soil are going to come down hill. But as Edgar points out, compass rows are just as sure to run through several different kinds of land —land that needs different crops and different treatment if it's going to be built up or even kept productive. You can't have one end of a row in corn and the other in grass.

This seems simple as Edgar explains it, pointing to the various crops that make natural patterns around the slopes. But it wasn't so easy getting the system started. Until 1944 he had to get along with only 70 acres of land. That's not enough for efficient farming, but it's even worse if the soil is thin. And Edgar's soil certainly was thin. He was not only short of land; he was short of soil. He was even losing soil from winter erosion, a kind of soil movement that occurs when thawing makes a fluid layer of thick soup along the surface of bare ground.

Corn and grain yields were low and forage scarce. Edgar needed more livestock, but he couldn't grow the necessary feed. When visitors comment on the present "new look" of his farm, he points to a gully-scarred hillside on an adjoining farm. "Some of my land would have had a very old and worn-out look like that hill over there," he says, "if I hadn't changed my way of using it."

Signed Agreement

That's how it was in 1941 when the Montgomery Soil Conservation District was organized. Here was a chance to get exactly the kind of help he needed, and Edgar lost no time in getting it. If you look at the district's list of soil conservation farms in the Soil Conservation Service headquarters at Crawfordsville, you'll find Edgar's name at the top of the list: AGREEMENT NO. 1, EDGAR E. WILSON. Because of his active interest in organizing the new district, Edgar was elected vice-chairman of the board of supervisors and has been on the board ever since.

With the soil conservation plan, which he developed with the help of Arnold Beck of the U. S. Soil Conservation Service, was a map showing the various kinds of land on his farm and a colored key indicating the recommended uses for each. At last Edgar was ready to put his soil-building plan to work. Right then and there he be-

gan ripping out the old compass fences. Since that time a "field" on the Wilson farm has meant a certain class of land, not an area enclosed by a fence. With this change made, he could now plan for rotations, fertilizer, and other treatment best suited for each land class. Since slope is one factor considered in determining land classes, the new field boundaries run level around the hillsides—a natural arrangement for contour farming.

"If an emergency now forced me to push my land for cereal crops," he said, "I could safely grow more corn and grain than I could before because I could put it on the more level land and leave the steeper land in meadow."

The next step was to build terraces to keep heavy rains from damaging the longer slopes. The terrace lines had to be laid out with a level by an agricultural worker. Edgar did the work with his own plow. The first heavy rain after the terracing of a new slope was an event anxiously watched for. Disobligingly, many of these came in the middle of the night, but Edgar was out with a lantern to see if the outlets had enough capacity to carry the runoff water.

With contour farming there would be less runoff to cause gullying in the draws but when draws are cultivated it doesn't take much water to do a lot of damage. Taking no chances, Edgar left all natural waterways in grass or seeded them if they were cultivated.

The first test of the new system came at harvest time in 1942. Edgar knew months ahead what the answer was going to be. With better yields and better farm prices, he was able in 1944 to buy an adjoining 40 acres. In 1946 his longer rotations and new land-use plan began to pay off. A farm survey made that year by Purdue University indicated that his per-acre labor income of $172 was the highest in the central Indiana group in which his farm was included.

Things were definitely looking brighter on the Wilson farm. With added confidence in his ability to build up run-down soil, he bought another 50 acres in 1948. This tract had sold for taxes in the '30s and was so poor that no tenant with experience and

(*Turn to page* 43)

Fig. 1. This is the way the Wilson farm looked in late August of 1949. Wilson's married son Kenneth lives at the right. Edgar and his wife and daughter Mary Jane, 17, occupy the farmstead farther away at the left.

What Is Fertilizer Worth?

By L. Glenn Zinn

Instructor of Veterans in Agriculture, Philippi, West Virginia

THIS is the third year that our class of Veteran Farm Trainees have run a contest to see how much corn could be grown on the average hill land in West Virginia. They attempt the use of enough fertilizer to insure sufficient plant food to enable the corn to make its maximum yield under the conditions that are present in their particular soil. Our experiences so far show that it makes very little difference about the soil if we have enough stalks on the ground and apply enough plant food.

This is rather a strong statement and many authorities will take issue with us on the matter. However, we believe we have proof which will show up in what we say below.

Eight men completed the test in 1950, with the results shown in the table below.

Now let's look at some of the conditions under which these fields of corn were grown. Ira Yost planted his on a hill with slope of about 30%. It was a sandy clay and the erosion was bad as the soil had been cropped until it would not produce and then had been abandoned. It was in corn in 1944 and had not been plowed since, but had grown up in weeds. There was little topsoil so it was plowed only six inches deep, and that turned up a lot of subsoil. Yost plowed down 800 lbs. of 5-10-10 fertilizer, disked in 400 lbs. of 2-12-12, put 200 lbs. of 5-10-10 in the row, and sidedressed with 200 lbs. of nitrate of soda, making a total of 1,600 lbs.

This sidedressing was put on July 7 which was a little late for best results. The corn was cultivated three times and hoed once. It was planted on May 20 and husked on October 18 and was well matured.

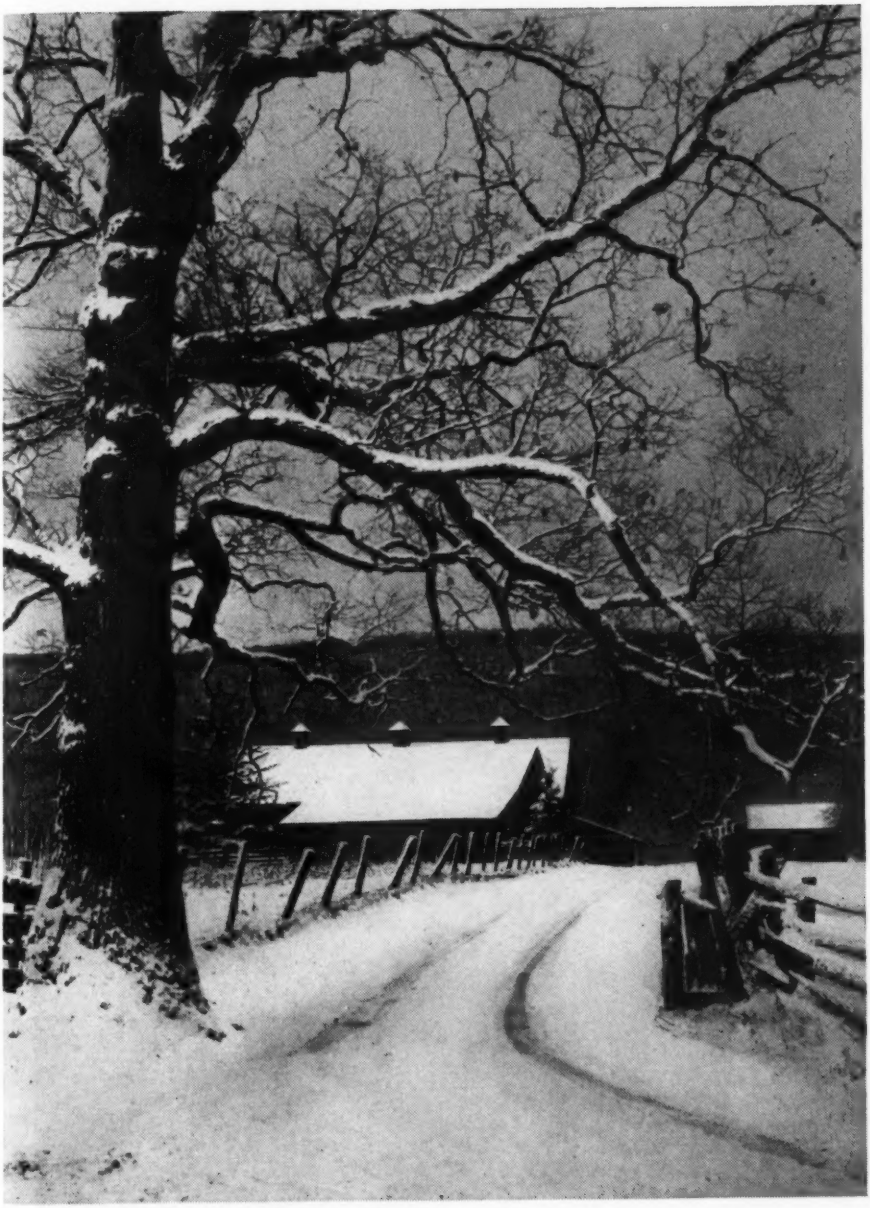
James Kerns, who won first place last season, planted in the same field this year. He plowed down the fodder after grazing it with a herd of cattle in the fall, applied 10 tons of manure per acre, plowed down 750 lbs. of 5-10-10, and applied 300 lbs. of same in the row. He did not topdress.

James had a good plot of three acres of nearly level upland which had been well treated in the past and should have

(*Turn to page* 45)

Grower	Yield Bu.	Variety	Fert. Cost	Stalk Count	Fert. Cost per Bu.
Ira Yost	126	WVaB17	$40.00	15,600	31.7 cents
James Kerns	122	WVaB25	40.00	16,890	32.8
Henry Vincent	106	WVaB25&17	42.00	13,318	39.6
Adren Gough	98	WVaB25	50.00	9,289	51.0
Junior Bolyard	92	Ohio W17	33.00	12,500	35.8
William Mitchell	89	WVaB25	44.00	12,450	49.4
Arnett Sayres	83	WVaB25	40.00	8,160	48.2
Beryl Hardin	80	WVaB25	30.00	10,304	37.5
Average	99.5		$39.87	12,313	40.7

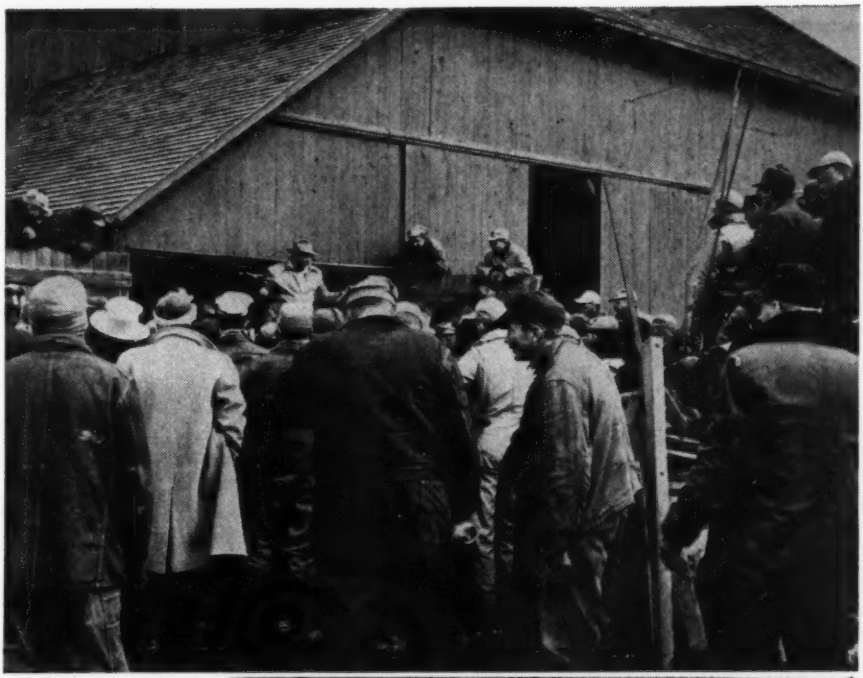
PICTORIAL



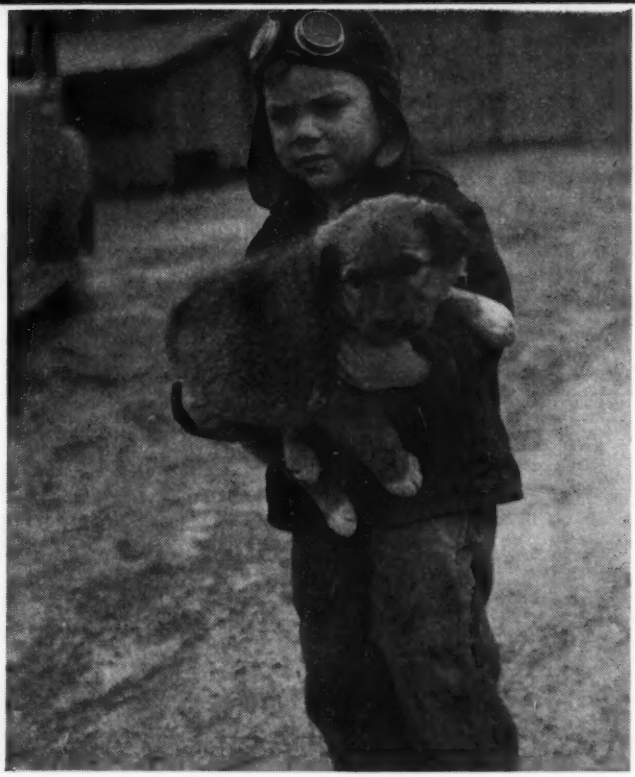
The Frolic Architecture of the Snow . . . Emerson

Left: Drifts of prairie silt resulting from a heavy windstorm.

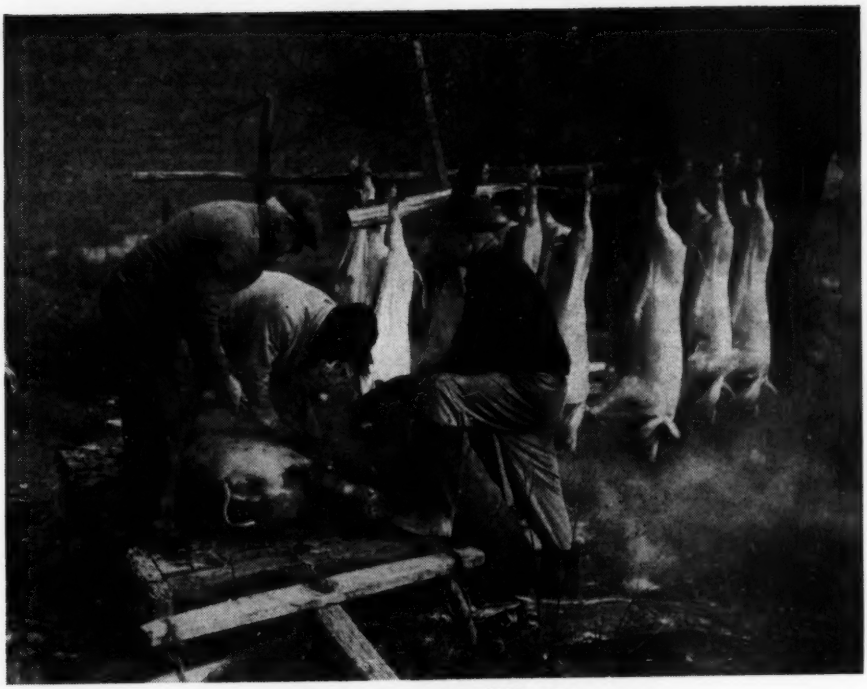
Below: Cornstalks washed from a field by an early-season flood.



Above: Late winter auctions find most farmers with time to attend.

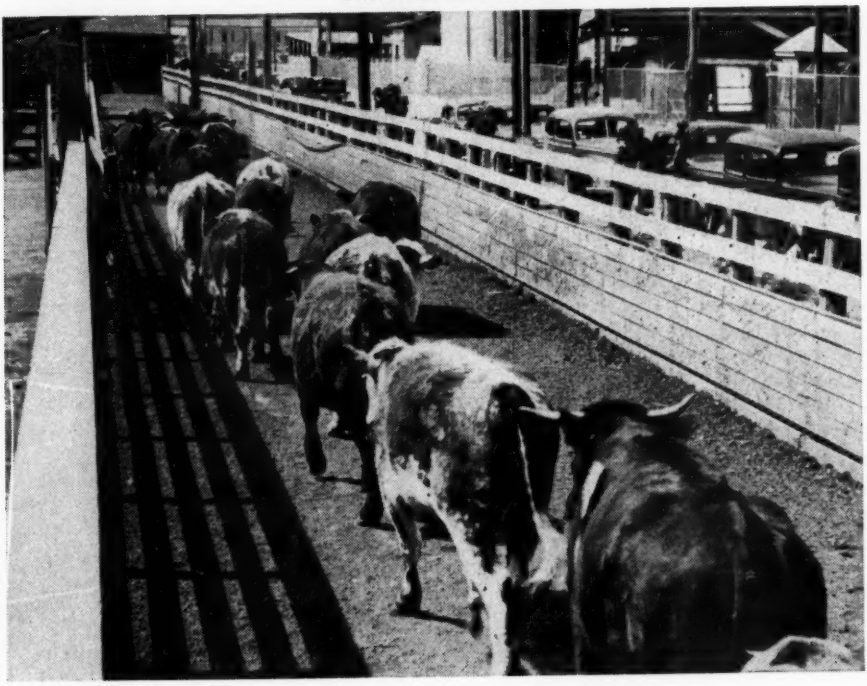


Right: Tender, white, young feet must be protected in sloppy weather.



Above: **For once, beautifully clean.**

Below: **The last mile.**



The Editors Talk

National Pasture Consciousness

Grassland farming is not a new idea. It is as old as agriculture. From the beginning, farmers have depended on grassland crops as the chief source of feed for livestock.

During the last half century when livestock farming in this country was making great strides, the production of grain crops also increased enormously. Depletion of soil fertility from soil erosion in grain farming has brought us face to face with the necessity for doing something to conserve our soil resources in order that we may be assured of a continued abundance of nutritious food.

Development of national soil and water conservation programs is making great progress in many areas. Leaders in the movement believe that much of our land, particularly that subject to erosion, should be shifted from soil-depleting crops to soil-conserving crops, such as grasses and legumes. Such a shift will not only reduce losses from erosion and tend to reduce the recurring grain surpluses that have plagued us in the past, but greatly increase the production of livestock.

It is well for everyone connected with agriculture, as the planting season approaches, to review the ten tasks set forth to attain the goal of a system of balanced farming in which grasses and legumes are given a full opportunity to enrich our diets as well as our soil. This goal was set up last November by the U. S. Department of Agriculture and the Association of Land-Grant Colleges and Universities, and the tasks include:

1. Cooperate with farmers in fitting grasses, legumes, and livestock in their plans for balanced, profitable farming.

2. Encourage the wise use of lime, fertilizers, and farm manures in line with local soil requirements, future cropping needs, and ascertained research results.

3. Grow more high quality forage by renovating pastures, reseeding pastures, hayland, and range with legumes and grasses in proper mixture, adopting improved rotations based on desirable legumes and grasses, planting cover crops, and converting suitable land to grass of good character.

4. Employ modern and scientific practices of proven quality in the development and management of livestock herds and the pastures and ranges on which they graze.

5. Provide and conserve water for livestock and forage production by installing stockwater ponds, wells, waterspreaders, contour furrows, terraces, irrigation systems, and similar improvements.

6. Control weeds, brush, insect pests, and livestock parasites and diseases.

7. Furnish farmers the best scientific information on harvesting and storing forage, as hay or silage, so as to conserve maximum feed and maintain nutritional quality.

8. Assure adequate stocks of adopted legume and grass seeds and encourage their best utilization through efficient methods of production, harvesting, storing, distributing, and planting them in good seedbeds.

9. Reduce farm costs and raise net income by employing suitable combinations of grasslands and livestock improvement practices in balanced farm plans.

10. Make available to farmers and ranchers the appropriate financial aid in the form of credit and conservation payments and encourage leasing arrangements which will make improvements profitable for both tenants and landlords.

It has been estimated that the production of livestock products, particularly those from cattle and sheep which are currently in high market demand among consumers, could be lifted 20 to 25 per cent by the complete and continuing application of known and tested measures for improving and managing grasslands. To some extent the improved practices are being used in various parts of the country, and probably one-fourth of the Nation's grasslands have been improved by one, two, or even more of the recommendations. However, from reliable sources comes the estimate that as much as 90 per cent of the grasslands in this country still require improvements. In this, lies the urgent need for assistance from everyone who can further our National Pasture Consciousness.

Custom-mixed, Delivered, and Applied

It is safe to guess that many a farmer in the rush of his spring work and with a shortage of help would be glad to step to his telephone and order his fertilizer, mixed according to his needs, delivered, and applied on a certain day. This for most of these farmers may still be a long way in the future, but it is being done in some scattered sections of the country. And it not only is proving practical but in many cases as cheap as where the farmer purchases the fertilizer, hauls it to his farm, and spreads it himself. The fertilizer company can offset much of the cost of this service by saving the cost of bagging; the farmer saves labor costs and time sorely needed for other planting operations.

One of the factors involved in such a service is the possibility of a farmer's being able to get a mixture of the plant foods most closely satisfying the needs of the crop he is to plant and the deficiencies of the soil in the field in which this crop is to be planted. The greatly increased number of soil-testing laboratories being set up over large sections of the country gives the farmer better information on these needs than he had in the past.

Difficulties are being encountered, of course. There have been and will be many technical problems and matters of proper equipment to settle. Spring weather cannot be depended upon and often fields are too wet to allow spreading by the heavy trucks at specified times. The service appears to be better adapted to broadcast than to row-crop applications. However, a lot of people believe that its advantages out-weigh the disadvantages. The progress of this new development in the fertilizer industry will be interesting to watch.

Season Average Prices Received by Farmers for Specified Commodities *

Crop Year	Cotton Cents per lb. Aug.-July	Tobacco Cents per lb.	Potatoes Cents per bu. July-June	Sweet Potatoes Cents per bu. July-June	Corn Cents per bu. Oct.-Sept.	Wheat Cents per bu. July-June	Hay [1] Dollars per ton July-June	Cottonseed Dollars per ton July-June	Truck Crops ....
Av. Aug. 1909–July 1914....	12.4	10.0	69.7	87.8	64.2	88.4	11.87	22.55	....
1925.....	19.6	16.8	170.5	165.1	69.9	143.7	12.77	31.59	....
1926.....	12.5	17.9	131.4	117.4	74.5	121.7	13.24	22.04	....
1927.....	20.2	20.7	101.9	109.0	85.0	119.0	10.29	34.83	....
1928.....	18.0	20.0	53.2	118.0	84.0	99.8	11.22	34.17	....
1929.....	16.8	18.3	131.6	117.1	79.9	103.6	10.90	30.92	....
1930.....	9.5	12.8	91.2	108.1	59.8	67.1	11.06	22.04	....
1931.....	5.7	8.2	46.0	72.6	32.0	39.0	8.69	8.97	....
1932.....	6.5	10.5	38.0	54.2	31.9	38.2	6.20	10.33	....
1933.....	10.2	13.0	82.4	69.4	52.2	74.4	8.09	12.88	....
1934.....	12.4	21.3	44.6	79.8	81.5	84.8	13.20	33.00	....
1935.....	11.1	18.4	59.3	70.3	65.5	83.2	7.52	30.54	....
1936.....	12.4	23.6	114.2	92.9	104.4	102.5	11.20	33.36	....
1937.....	8.4	20.4	52.9	78.0	51.8	96.2	8.74	19.51	....
1938.....	8.6	19.6	55.7	69.8	48.6	56.2	6.78	21.79	....
1939.....	9.1	15.4	69.7	73.4	56.8	69.1	7.94	21.17	....
1940.....	9.9	16.0	54.1	85.4	61.8	68.2	7.59	21.73	....
1941.....	17.0	26.4	80.8	92.2	75.1	94.4	9.70	47.65	....
1942.....	19.0	36.9	117.0	118.0	91.7	110.0	10.80	45.61	....
1943.....	19.9	40.5	131.0	206.0	112.0	136.0	14.80	52.10	....
1944.....	20.7	42.0	150.0	190.0	109.0	141.0	16.50	52.70	....
1945.....	22.5	36.6	143.0	204.0	127.0	150.0	15.10	51.10	....
1946.....	32.6	38.2	124.0	218.0	156.0	191.0	16.70	72.00	....
1947.....	31.9	38.0	162.0	217.0	216.0	229.0	17.60	85.90	....
1948.....	30.4	48.2	155.0	222.0	129.0	200.0	18.45	67.20	....
1949.....	28.6	46.3	128.0	214.0	119.0	186.0	16.55	43.40	....
1950									
February....	27.50	34.1	133.0	221.0	116.0	193.0	16.75	43.60	....
March.....	28.05	32.0	132.0	222.0	119.0	198.0	16.45	43.00	....
April.....	28.74	....	134.0	228.0	126.0	201.0	16.65	44.40	....
May.....	29.24	48.5	128.0	228.0	134.0	204.0	17.25	45.20	....
June.....	29.91	49.7	127.0	211.0	136.0	193.0	16.05	46.20	....
July.....	33.05	45.5	127.0	208.0	144.0	199.0	15.15	52.00	....
August.....	36.95	53.1	122.0	218.0	144.0	197.0	15.45	70.90	....
September...	39.98	55.4	105.0	192.0	144.0	194.0	15.55	78.80	....
October.....	38.90	55.1	85.8	154.0	137.0	191.0	15.85	81.50	....
November....	41.13	52.5	87.8	148.0	137.0	194.0	16.45	98.40	....
December....	40.36	47.2	88.9	173.0	145.0	203.0	17.05	102.00	....
1951									
January.....	41.31	45.9	98.6	194.0	154.0	209.0	17.85	101.00	....
Index Numbers (Aug. 1909—July 1914 = 100)									
1925.....	158	168	245	188	109	163	108	140	143
1926.....	101	179	189	134	116	138	112	98	139
1927.....	163	207	146	124	132	135	87	154	127
1928.....	145	200	76	134	131	113	95	152	154
1929.....	135	183	189	133	124	117	92	137	137
1930.....	77	128	131	123	93	76	93	98	129
1931.....	46	82	66	83	50	44	73	40	115
1932.....	52	105	55	62	50	43	52	46	102
1933.....	82	130	118	79	81	84	68	57	91
1934.....	100	213	64	91	127	96	111	146	95
1935.....	90	184	85	80	102	94	63	135	119
1936.....	100	236	164	106	163	116	94	148	104
1937.....	68	204	76	89	81	109	74	87	110
1938.....	69	196	80	79	76	64	57	97	88
1939.....	73	154	100	84	88	78	67	94	91
1940.....	80	160	78	97	96	77	64	96	111
1941.....	137	264	116	105	117	107	82	211	129
1942.....	153	369	168	134	143	124	91	202	163
1943.....	160	405	188	235	174	154	125	231	245
1944.....	167	420	214	216	170	160	139	234	212
1945.....	181	366	205	232	198	170	127	227	207
1946.....	263	382	178	248	212	209	141	319	182
1947.....	257	380	232	248	336	259	148	381	226
1948.....	245	482	222	253	201	226	155	298	214
1949.....	231	463	184	244	210	210	139	192	201
1950									
February....	222	341	191	252	181	218	141	193	203
March.....	226	320	189	253	185	224	139	191	168
April.....	232	...	192	260	196	227	140	197	205
May.....	236	485	184	260	209	231	145	200	178
June.....	241	497	182	240	212	218	135	205	182
July.....	267	455	182	237	224	225	128	231	200
August.....	298	531	175	248	224	223	130	314	164
September...	322	554	151	219	224	219	131	349	126
October.....	314	551	123	175	213	216	134	361	138
November....	332	525	126	169	213	219	139	436	188
December....	325	472	128	197	226	230	144	452	211
1951									
January.....	333	459	141	221	240	236	150	448	324

Wholesale Prices of Ammoniates

	Nitrate of soda bulk per unit N	Sulphate of ammonia bulk per unit N	Cottonseed meal S. E. Mills per unit N	Fish scrap, dried 11–12% ammonia, 15% bone phosphate, f.o.b. factory bulk per unit N	Tankage 11% ammonia, 15% bone phosphate, f.o.b. Chicago, bulk, per Unit N	High grade ground blood, 16–17% ammonia, Chicago, bulk, per Unit N
1910–14	$2.68	$2.85	$3.50	$3.53	$3.37	$3.52
1925	3.11	2.47	5.41	5.34	3.97	4.75
1926	3.06	2.41	4.40	4.95	4.36	4.90
1927	3.01	2.26	5.07	5.87	4.32	5.70
1928	2.67	2.30	7.06	6.63	4.92	6.00
1929	2.57	2.04	5.64	5.00	4.61	5.72
1930	2.47	1.81	4.78	4.96	3.79	4.58
1931	2.34	1.46	3.10	3.95	2.11	2.46
1932	1.87	1.04	2.18	2.18	1.21	1.36
1933	1.52	1.12	2.95	2.86	2.06	2.46
1934	1.52	1.20	4.46	3.15	2.67	3.27
1935	1.47	1.15	4.59	3.10	3.06	3.65
1936	1.53	1.23	4.17	3.42	3.58	4.25
1937	1.63	1.32	4.91	4.66	4.04	4.80
1938	1.69	1.38	3.69	3.76	3.15	3.53
1939	1.69	1.35	4.02	4.41	3.87	3.90
1940	1.69	1.36	4.64	4.36	3.33	3.39
1941	1.69	1.41	5.50	5.32	3.76	4.43
1942	1.74	1.41	6.11	5.77	5.04	6.76
1943	1.75	1.42	6.30	5.77	4.86	6.62
1944	1.75	1.42	7.68	5.77	4.86	6.71
1945	1.75	1.42	7.81	5.77	4.86	6.71
1946	1.97	1.44	11.04	7.38	6.60	9.33
1947	2.50	1.60	12.72	10.66	12.63	10.46
1948	2.86	2.03	12.94	10.59	10.84	9.85
1949	3.15	2.29	10.11	13.18	10.73	10.62
1950						
February	3.00	2.32	9.37	13.45	8.96	8.96
March	3.00	2.32	9.70	13.01	10.17	9.34
April	3.00	2.32	10.34	12.58	10.39	8.19
May	3.00	2.05	10.74	11.97	10.14	7.59
June	3.00	1.71	10.55	10.79	9.41	7.36
July	3.00	1.71	11.53	10.71	9.35	8.74
August	3.00	1.71	11.44	11.06	10.62	9.87
September	3.00	1.71	11.44	10.85	10.85	10.32
October	3.00	1.71	11.86	10.63	10.62	10.32
November	3.00	1.68	11.96	10.63	10.85	10.62
December	3.00	1.88	13.48	10.95	10.93	10.93
1951						
January	3.10	1.88	13.37	11.30	11.29	11.11
Index Numbers (1910-14 = 100)						
1925	115	87	155	151	117	135
1926	113	84	126	140	129	139
1927	112	79	145	166	128	162
1928	100	81	202	188	146	170
1929	96	72	161	142	137	162
1930	92	64	137	141	112	130
1931	88	51	89	112	63	70
1932	71	36	62	62	36	39
1933	59	39	84	81	97	71
1934	59	42	127	89	79	93
1935	57	40	131	88	91	104
1936	59	43	119	97	106	131
1937	61	46	140	132	120	122
1938	63	48	105	106	93	100
1939	63	47	115	125	115	111
1940	63	48	133	124	99	96
1941	63	49	157	151	112	126
1942	65	49	175	163	150	192
1943	65	50	180	163	144	189
1944	65	50	219	163	144	191
1945	65	50	223	163	144	191
1946	74	51	315	209	196	265
1947	93	56	363	302	374	297
1948	107	71	370	300	322	280
1949	117	80	289	373	318	302
1950						
February	112	81	268	381	266	255
March	112	81	277	369	302	265
April	112	81	295	356	308	233
May	112	72	307	339	301	216
June	112	60	301	306	279	209
July	112	60	329	303	277	248
August	112	60	327	313	315	280
September	112	60	327	307	322	293
October	112	60	339	301	315	293
November	112	59	342	301	322	302
December	112	66	385	310	324	311
1951						
January	116	66	382	320	335	316

Wholesale Prices of Phosphates and Potash * *

	Superphosphate, Baltimore, per unit	Florida land pebble, 68% f.o.b. mines, bulk, per ton	Tennessee phosphate rock, 75% f.o.b. mines, bulk, per ton	Muriate of potash bulk, per unit, c.i.f. Atlantic and Gulf ports[1]	Sulphate of potash in bags, per unit, c.i.f. Atlantic and Gulf ports[1]	Sulphate of potash magnesia, per ton, c.i.f. Atlantic and Gulf ports[1]	Manure salts bulk, per unit, c.i.f. Atlantic and Gulf ports[1]
1910–14	$0.536	$3.61	$4.88	$0.714	$0.953	$24.18	$0.657
1925	.600	2.44	6.16	.584	.860	23.72	.483
1926	.598	3.20	5.57	.596	.854	23.58	.537
1927	.525	3.09	5.50	.646	.924	25.55	.586
1928	.580	3.12	5.50	.669	.957	26.46	.607
1929	.609	3.18	5.50	.672	.962	26.59	.610
1930	.542	3.18	5.50	.681	.973	26.92	.618
1931	.485	3.18	5.50	.681	.973	26.92	.618
1932	.458	3.18	5.50	.681	.963	26.90	.618
1933	.434	3.11	5.50	.662	.864	25.10	.601
1934	.487	3.14	5.67	.486	.751	22.49	.483
1935	.492	3.30	5.69	.415	.684	21.44	.444
1936	.476	1.85	5.50	.464	.708	22.94	.505
1937	.510	1.85	5.50	.508	.757	24.70	.556
1938	.492	1.85	5.50	.523	.774	15.17	.572
1939	.478	1.90	5.50	.521	.751	24.52	.570
1940	.516	1.90	5.50	.517	.730	24.75	.573
1941	.547	1.94	5.64	.522	.780	25.55	.367
1942	.600	2.13	6.29	.522	.810	25.74	.205
1943	.631	2.00	5.93	.522	.786	25.35	.195
1944	.645	2.10	6.10	.522	.777	25.35	.195
1945	.650	2.20	6.23	.522	.777	25.35	.195
1946	.671	2.41	6.50	.508	.769	24.70	.190
1947	.746	3.05	6.60	.432	.706	18.93	.195
1948	.764	4.27	6.60	.397	.681	14.14	.195
1949	.770	3.88	6.22	.397	.703	14.14	.195
1950							
February	.760	3.76	5.47	.375	.720	14.50	.200
March	.760	3.76	5.47	.375	.720	14.50	.200
April	.760	3.76	5.47	.375	.720	14.50	.200
May	.760	3.76	5.47	.375	.720	14.50	.200
June	.760	3.76	5.47	.336	.647	12.77	.176
July	.760	3.76	5.47	.368	.704	13.98	.193
August	.760	3.76	5.47	.368	.704	13.98	.193
September	.760	3.75	5.47	.368	.704	13.98	.193
October	.760	3.73	5.47	.386	.704	13.98	.193
November	.760	3.73	5.47	.386	.732	14.72	.193
December	.798	3.73	5.47	.420	.796	16.00	.210
1951							
January	.810	3.73	5.47	.420	.796	16.00	.210
Index Numbers (1910-14 = 100)							
1925	110	68	126	82	90	98	74
1926	112	88	114	83	90	98	82
1927	100	86	113	90	97	106	89
1928	108	86	113	94	100	109	92
1929	114	88	113	94	101	110	93
1930	101	88	113	95	102	111	94
1931	90	88	113	95	102	111	94
1932	85	88	113	95	101	111	94
1933	81	86	113	93	91	104	91
1934	91	87	110	68	79	93	74
1935	92	91	117	58	72	89	68
1936	89	51	113	65	74	95	77
1937	95	51	113	71	79	102	85
1938	92	51	113	73	81	104	87
1939	89	53	113	73	79	101	87
1940	96	53	113	72	77	102	87
1941	102	54	110	73	82	106	87
1942	112	59	129	73	85	106	84
1943	117	55	121	73	82	105	83
1944	120	58	125	73	82	105	83
1945	121	61	128	73	82	105	83
1946	125	67	133	71	81	102	82
1947	139	84	135	70	74	78	83
1948	143	118	135	67	72	58	83
1949	144	108	128	67	74	58	83
1950							
February	142	104	112	68	76	60	83
March	142	104	112	68	76	60	83
April	142	104	112	68	76	60	83
May	142	104	112	68	76	60	83
June	142	104	112	63	68	53	80
July	142	104	112	67	74	58	82
August	142	104	112	67	74	58	82
September	142	104	112	67	74	58	82
October	142	103	112	70	74	58	82
November	142	103	112	70	77	61	82
December	149	103	112	75	84	66	85
1951							
January	151	103	112	75	84	66	85

Combined Index Numbers of Prices of Fertilizer Materials, Farm Products and All Commodities

	Farm prices*	Prices paid by farmers for commodities bought*	Wholesale prices of all commodities†	Fertilizer material‡	Chemical ammoniates	Organic ammoniates	Superphosphate	Potash**
1925.....	156	153	151	112	100	131	109	80
1926.....	146	150	146	119	94	135	112	86
1927.....	141	148	139	116	89	150	100	94
1928.....	149	152	141	121	87	177	108	97
1929.....	148	150	139	114	79	146	114	97
1930.....	125	140	126	105	72	131	101	99
1931.....	87	119	107	83	62	83	90	99
1932.....	65	102	95	71	46	48	85	99
1933.....	70	104	96	70	45	71	81	95
1934.....	90	118	109	72	47	90	91	72
1935.....	109	123	117	70	45	97	92	63
1936.....	114	123	118	73	47	107	89	69
1937.....	122	130	126	81	50	129	95	75
1938.....	97	122	115	78	52	101	92	77
1939.....	95	121	112	79	51	119	89	77
1940.....	100	122	115	80	52	114	96	77
1941.....	123	130	127	86	56	130	102	77
1942.....	158	149	144	93	57	161	112	77
1943.....	192	165	151	94	57	160	117	77
1944.....	196	174	152	96	57	174	120	76
1945.....	206	180	154	97	57	175	121	76
1946.....	234	197	177	107	62	240	125	75
1947.....	275	231	222	130	74	362	139	72
1948.....	285	250	241	134	89	314	143	70
1949.....	249	240	226	137	99	319	144	70
1950								
February..	237	237	223	132	96	286	142	72
March....	237	239	223	134	96	305	142	72
April.....	241	240	223	135	96	313	142	72
May.....	247	244	228	132	91	311	142	72
June.....	247	245	230	126	85	293	142	66
July.....	263	247	238	128	85	301	142	70
August....	267	248	243	131	85	321	142	70
September.	272	252	247	131	85	324	142	70
October...	268	253	247	131	85	323	142	73
November.	276	255	251	132	85	328	142	74
December..	286	257	256	138	88	346	149	78
1951								
January...	300	262	261	140	90	351	151	78

* U. S. D. A. figures, revised January 1950. Beginning January 1946 farm prices and index numbers of specific farm products revised from a calendar year to a crop-year basis. Truck crops index adjusted to the 1924 level of the all-commodity index.

† Department of Labor index converted to 1910-14 base.

‡ The Index numbers of prices of fertilizer materials are based on original study made by the Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York. These indexes are complete since 1897. The series was revised and reweighted as of March 1940 and November 1942.

[1] Beginning July 1949, baled hay prices reduced by $4.75 a ton to be comparable to loose hay prices previously quoted.

[2] All potash salts now quoted F.O.B. mines only: manure salts since June 1941, other carriers since June 1947.

**** The weighted average of prices actually paid for potash is lower than the annual average because since 1926 over 90% of the potash used in agriculture has been contracted for during the discount period. Since 1937, the maximum discount has been 12%. Applied to muriate of potash, a price slightly above $.471 per unit K_2O thus more nearly approximates the annual average than do prices based on arithmetical averages of monthly quotations.**

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

"Behavior of Nitrogenous Fertilizers in Alkaline Calcareous Soils: I. Nitrifying Characteristics of Some Organic Compounds Under Controlled Conditions," Agr. Exp. Sta., Univ. of Ariz., Tucson, Ariz., Tech. Bul. No. 120, Oct. 1950, W. H. Fuller, A. B. Caster, and W. T. McGeorge.

"The Fertilizer Trade July 1, 1949-June 30, 1950," Dominion Bur. of Stat., Dept. of Trade and Commerce, Ottawa, Ont., Can., Vol. 2—Part XVIII-D-1.

"The Care and Use of Poultry Manure," Agr. Exp. Sta., Univ. of Conn., Storrs, Conn., Inf-13, Apr. 1950, S. Papanos and B. A. Brown.

"Louisiana Fertilizer Report, 1949-1950," La. Dept. of Agr. and Immigration, Baton Rouge, La., E. A. Epps, Jr.

"Effect of Rate and Source of Potash on Yield and Starch Content of Potatoes," Agr. Exp. Sta., Univ. of Me., Orono, Me., Bul. 481, May, 1950, G. L. Terman.

"Plant Food Recommendations for Maryland Horticultural Crops," Ext. Serv., Univ. of Md., College Park, Md., Misc. Ext. Pub. 1, Jan. 1, 1951.

"Fertilizer Grades and Ratios for Minnesota," Agr. Ext. Serv., Univ. of Minn., St. Paul, Minn., Ext. Folder 145, Rev. Jan. 1950, C. O. Rost, P. M. Burson, E. R. Duncan, and H. E. Jones.

"An Economic Appraisal of Anhydrous Ammonia as a Nitrogenous Fertilizer," Agr. Exp. Sta., Miss. State College, State College, Miss., Cir. 152, June 1950, J. P. Gaines and G. B. Crowe.

"General Fertilizer Recommendations for Eastern Nebraska," Ext. Serv., Univ. of Neb., Lincoln, Neb., CC 105, M. D. Weldon and W. E. Ringler.

"Fertilizer and Lime Recommendations for New Jersey," Agr. Exp. Sta., Rutgers Univ., New Brunswick, N. J., Cir. 539, Nov. 1950.

"North Carolina Fertilizer Report 1949-1950," N. C. Dept. of Agr., Raleigh, N. C., No. 121, Dec. 1950.

"Fertilizer Report for the Year 1949," Pa. Dept. of Agr., Harrisburg, Pa., Vol. 33, No. 3, May-June 1950.

"Commercial Fertilizers in 1949-50," Agr. Exp. Sta., College Station, Texas, Bul. 726, Sept. 1950, J. F. Fudge and T. L. Ogier.

"The Inspection of Commercial Fertilizers and Agricultural Lime Products for 1950," Univ. of Vt., Burlington, Vt., Rpt. 16, Nov. 1950, L. S. Walker and E. F. Boyce.

"Order and Store Fertilizer and Insecticides Early for Your 1951 Cotton Crop," P.M.A., USDA, Wash., D. C., Pa. 141, Nov. 1950.

Soils

"Efficiency in Public Soil Conservation Programs," Agr. Exp. Sta., Iowa State College, Ames, Iowa, Prod. Econ. No. 3, Feb. 1950, E. O. Heady.

"Land Resources and Recommended Conservation Practices in Nebraska," Agr. Exp. Sta., Univ. of Neb., Lincoln, Neb., Bul. 395, Nov. 1949, F. Miller and A. Anderson.

"Salt Accumulation in Irrigated Soils The Prospect in Oklahoma," Agr. Exp. Sta., Okla. A&M College, Stillwater, Okla., Bul. No. B-360, Oct. 1950, H. J. Harper and O. E. Stout.

"Deep Plowing to Improve Sandy Land," Agr. Exp. Sta., Okla. A&M College, Stillwater, Okla., Bul. No. B-362, Dec. 1950, H. J. Harper and O. H. Brensing.

"The Relation of Soil Texture to Soluble Salt Accumulation in 29 Irrigated Soils in Oklahoma," Agr. Exp. Sta., Okla. A&M College, Stillwater, Okla., Tech. Bul. No. T-39, Oct. 1950, H. J. Harper and O. E. Stout.

"Drainage Practices for Oregon," Agr. Exp. Sta., Oreg. State College, Corvallis, Oreg., Sta. Bul. 492, Nov. 1950, W. L. Powers and A. S. King.

"Soil Conservation for 4-H Clubs," Clemson Agr. College, Clemson, S. C., Cir. 355, July 1950, E. C. Turner.

"Getting Acquainted with Our Soil," Cir. 4-H 62, Mar. 1950; "Our Land Our Living," Cir. 4-H 63, May 1950, Ext. Serv., Univ. of Wis., Madison, Wis., I. O. Hembre, W. McNeel, N. O. Stephenson, D. W. Niendorf, and E. O. Baker.

"Report of the Chief of The Soil Conservation Service 1950," USDA, Wash., D. C.

Crops

"Better Forage for Alaska," Agr. Exp. Sta., Univ. of Alaska, Palmer, Alaska, Cir. 12, June 1950, W. J. Sweetman, H. J. Hodgson, and A. H. Mick.

"Strawberry Growing," Inf. Serv., Dept. of Agr., Ottawa, Ont., Can., Pub. 838, Cir. 184, Aug. 1950.

"Progress Report 1939-1948," Dept. of Agr., Exp. Farms Service, Fort Vermilion, Alberta, Can.

"Research on the Management of Ladino Clover," Agr. Exp. Sta., Univ. of Conn., Storrs, Conn., Inf-8, Jan. 1950, B. A. Brown.

"Field Corn Report Mt. Carmel and Windson, Connecticut 1950," Agr. Exp. Sta., New Haven, Conn., P.R. 50GI, Jan. 2, 1951, D. F. Jones and H. L. Everett.

"Annual Flowers," Bul. 133, Oct. 1950, J. V. Watkins; "Citrus Propagation," Bul. 139, Rev. Aug. 1950, A. F. Camp; Agr. Ext. Serv., Gainesville, Fla.

"Torpedo Grass," Cir. S-14, June 1950, E. M. Hodges and D. W. Jones; "Dixie Runner Peanuts," Cir. S-16, June 1950, W. A. Carver and F. H. Hull; Agr. Exp. Sta., Univ. of Fla., Gainesville, Fla.

"1949 Annual Report," Agr. Ext. Serv., Univ. of Ga., Athens, Ga., Bul. 566, June 1950.

"Lespedeza," Agr. Ext. Serv., Univ. of Ga., Athens, Ga., Cir. 307, Rev. July 1950, E. D. Alexander, J. B. Preston, and J. R. Johnson.

"Sixteenth Biennial Report July 1, 1948 to June 30, 1950," Dept. of Agr., Boise, Idaho.

"Performance of Open-Pedigree Corn Hybrids in Indiana," Agr. Exp. Sta., Purdue Univ,. Lafayette, Ind., Sta. Cir. 340, July 1950, S. R. Miles and J. E. Newman.

"Effect of Maturity and Priming of Burley Tobacco on Yield, Quality, and Labor Requirements of the Crop," Bul. 552, May 1950, G. B. Byers, C. E. Bortner, and W. B. Back; "Seed Production of Ky 31 Fescue and Orchard Grass as Influenced by Rate of Planting, Nitrogen Fertilization, and Management," Bul. 554, June 1950, J. T. Spencer; Agr. Exp. Sta., Univ. of Ky., Lexington, Ky.

"Camellias for the Yard," Agr. Exp. Sta., La. State Univ., Baton Rouge, La., La. Bul. No. 391, Rev. June 1950, W. D. Kimbrough, C. E. Smith and R. H. Hanchey.

"Extension Reports Progress," Agr. Ext. Serv., Univ. of Me., Orono, Me., Ext. Bul. 405, Nov. 1950.

"Fruits for Maine," Agr. Ext. Serv., Univ. of Me., Orono, Me., Ext. Bul. 403, Sept. 1950, F. P. Eggert.

"Results of Winter Grazing Tests 1949-50," Agr. Exp. Sta., Miss. State College, State College, Miss., Cir. 155, Aug. 1950, H. Leveck, L. H. Horn, B. L. Arnold, S. P. Crockett, R. H. Means, L. Walton, C. L. Blount.

"Research for Farm and Home Annual Report of the Missouri Experiment Station, June 30, 1948-July 1, 1949," Agr. Exp. Sta., Univ. of Mo., Columbia, Mo., Bul. 535, Dec. 1949, J. H. Longwell and S. B. Shirky.

"Twelve Broadleaf Trees for Nebraska," Agr. Ext. Serv., Univ. of Neb., Lnicoln, Neb., E.C. 1727, Sept. 1950, E. G. Maxwell.

"Nebraska Outstate Varietal Tests of Spring Small Grains 1950," Outst. Test. Cir. 11, Oct. 1950, A. F. Dreier and P. L. Ehlers; "Nebraska Corn Performance Tests 1950," Outst. Test. Cir. 12, Dec. 1950, A. F. Dreier, J. H. Lonnquist, D. P. McGill, and P. L. Ehlers; Agr. Exp. Sta., Univ. of Neb., Lincoln, Neb.

"Report of the Nevada State Department of Agriculture for the Fiscal Years Ending June 30, 1949-1950," Dept. of Agr., Carson City, Nevada.

"The Rock Garden," Ext. Bul. 403, Rev. May 1950, H. T. Skinner; "Cherry Growing in New York," Ext. Bul. 787, Sept. 1950, L. J. Edgerton; "Cultural Practices in the Bearing Apple Orchard," Bul. 789, Sept. 1950, M. B. Hoffman and Damon Boynton; Cornell Univ., Ithaca, N. Y.

"Timber Survey of the Hocking State Forest," Agr. Exp. Sta., Wooster, Ohio, Res. Cir. 3, Dec. 1950, E. A. Conway.

"Performance Tests of Corn Varieties and Hybrids 1950," Agr. Exp. Sta., Okla. A&M College, Stillwater, Okla., Mis. Pub. MP-18, Dec. 1950, J. S. Brooks and H. Pass.

"Trends and Variations in Yields from the Jordan Fertility Plots," Agr. Exp. Sta., Pa. State College, State College, Pa., Bul. 533, Oct. 1950, O. Nissen, H. A. Meyer, and C. Richer.

"Growing Small Fruits for Home Use," Agr. Ext. Serv., Pa. State College, State College, Pa., Cir. 368, Oct. 1950.

"Hybrid Delphinium," Leaf. 137, Sept. 1950; "Gladiolus," Leaf. 138, Sept. 1950; "Peonies," Leaf. 139, Sept. 1950; "Hardy Chrysanthemums," Leaf. 140, Sept. 1950; "Dahlias," Leaf. 141, Sept. 1950; Agr. Ext. Serv., Pa. State College, State College, Pa., A. O. Rasmussen, R. S. Kirby, and J. O. Pepper.

"Report of the Federal Experiment Station in Puerto Rico 1950," Fed. Exp. Sta., Mayaguez, P. R., Nov. 1950.

"Grazing Crops for Poultry," Cir. 185, Rev. Aug. 1950, P. H. Gooding; "Beef Cattle in South Carolina," Cir. 356, July 1950, A. L. DuRant, W. C. Nettles, and H. A. Woodle; Agr. Ext. Serv., Clemson Agr. College, Clemson, S. C.

"Tennessean Strawberry," Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn., Cir. No. 105, Aug. 1950, B. D. Drain and W. E. Roever.

"Cotton Variety Tests in the Lower Rio Grande Valley, 1950," P. R. 1273, Sept. 15, 1950, J. L. Hubbard, C. A. Burleson, P. W. Leeper, and W. R. Cowley; "Crop Variety Tests at the Blackland Experiment Station, 1950," P. R. 1281, Oct. 6, 1950, E. N. Stiver, J. W. Collier, and J. R. Johnston; "Winter Annual Legumes, Brazos River Valley Laboratory, 1949-50," P. R. 1282, Oct. 13, 1950, C.

Harvey and R. C. Potts; "The Effect of Legumes, Nitrogen Fertilizer and Row Systems on the Yield of Corn on Miller Clay Soil," P. R. 1285, Oct. 27, 1950, H. E. Rea, F. A. Wolters, and J. E. Roberts; Agr. Exp. Sta., Texas A&M College, College Station, Texas.

"The Nutritive Value of Range Forage as Affected by Vegetation Type, Site, and Stage of Maturity," Agr. Exp. Sta. Utah State College, Logan, Utah, Bul. 344, C. W. Cook and L. E. Harris.

"Strawberry Growing in Washington," Ext. Serv., State College of Wash., Pullman, Wash., Ext. Bul. No. 246 (Rev.), Sept. 1950, J. C. Snyder.

"Pasture Management," Ext. Serv., State College of Wash., Pullman, Wash., Ext. Bul. No. 435, Dec. 1950, LaMar Chapman, A. G. Law, and K. J. Morrison.

"Forage Crop Trials in West Virginia," Agr. Exp. Sta., W. Va. Univ., Morgantown, W. Va., Bul. 343, Nov. 1950, C. Veatch.

"Meet Summer Pasture Shortages with Sudan Grass," Ext. Serv., Univ. of Wis., Madison, Wis., St. Cir. 224, Rev. July, 1950, H. L. Ahlgren.

"Dryland Grass Seeding in Wyoming," Agr. Exp. Sta., Univ. of Wyo., Laramie, Wyo., Bul. 299, June 1950, O. K. Barnes, R. L. Lang, and A. A. Beetle.

"Report of the Chief of the Office of Experiment Stations Agricultural Research Administration 1950," USDA, Wash., D. C.

"Growing Annual Flowering Plants," Farm. Bul. No. 1171, S. L. Emsweller; "Ornamental Hedges for the Central Great Plains," Farm. Bul. No. 2019, A. C. Hildreth; "Soybean Production for Hay and Beans," Farm. Bul. No. 2024, W. J. Morse, J. L. Cartter, and E. E. Hartwig; USDA, Wash., D. C.

"Variability of Agronomic and Seed Compositional Characters in Soybeans, as Influenced by Variety and Time of Planting," USDA, Wash., D. C., Tech. Bul. No. 1017, Sept. 1950, M. G. Weiss, C. R. Weber, L. F. Williams, and A. H. Probst.

Economics

"Arizona Agriculture 1951," Agr. Exp. Sta., Univ. of Ariz., Tucson, Ariz., Bul. 232, Jan. 1951, G. W. Barr.

"Connecticut Crop, Livestock and Marketing Review for 1949," Dept. of Farms and Mkts., Hartford, Conn., Bul. No. 116, Nov. 1949.

"The Apple Industry in Connecticut 1950," Agr. Ext. Serv., Univ. of Conn., Storrs, Conn., Bul. 422, June 1950, A. W. Van Dyke.

"Social Security for Farm Workers," Main Ext. Cir. 263, Dec. 1950, A. W. Manchester.

"Conservation Services Available to New York Farmers," Cornell Univ., Ithaca, N. Y., Ext. Bul. 788, June 1950.

"Farmer's 1950 Income Tax," Univ. of N. C., Raleigh, N. C., Ext. Cir. 358, Oct. 1950.

"Oregon's Potatoes and Truck Crops 1870-1949," Ext. Serv., Oreg. State College, Corvallis, Oreg., Ext. Bul. 701, June 1950, F. H. Dahl, E. Horrell, L. R. Breithaupt, M. D. Thomas, and B. W. Coyle.

"Keeping Up on the Farm Outlook," Ext. Cir. No. 168, Dec. 30, 1950; "Keeping Up on the Farm Outlook," Ext. Cir. No. 186, Jan. 30, 1951, K. Hobson, Ext. Serv., State College of Wash., Pullman, Wash.

"The Balance Sheet and Current Financial Trends of Agriculture 1950," USDA, Wash., D. C., Agr. Inf. Bul. No. 26, Oct. 1950, F. L. Garlock, A. S. Tostlebe, R. J. Burroughs, H. C. Larsen, H. T. Lingard, L. A. Jones, and M. E. Wallace.

"Report of Activities Under the Research and Marketing Act 1950," Agr. Res. Adm., USDA, Wash., D. C.

"Agricultural Employer's Social Security Tax Guide," Bur. of Inter. Rev., U. S. Treas. Dept., Wash., D. C., Cir. A, Jan. 1951.

"The Agricultural Conservation Program Handbook for 1951 for: ACP 1061, Ariz.; ACP 1061, Calif.; ACP 1061, Conn.; ACP 1061, Ga.; ACP 1061, Ill.; ACP 1061, Ind.; ACP 1061, Kan.; ACP 1061, Mass.; ACP 1061, Mo.; ACP 1061, Nev.; ACP 1061, N. Mex.; ACP 1061, N. C.; ACP 1061, Ohio; ACP 1061, Oreg.; ACP 1061, Tenn.; ACP 1061, Va.; ACP 1061, Wash.; ACP 1061, W. Va.; ACP 1061, Wis.; USDA, Pro. and Mkt. Adm., Wash., D. C.

"Annual Report on Tobacco Statistics 1950," USDA, Wash., D. C., Stat. Bul. No. 92, Dec. 1950.

A prominent salesman, now retired, summed up his success in three simple words: "And Then Some."

"I discovered at an early age," he said, "that most of the differences between average people and top people could be explained in three words. The top people did what was expected of them—*and then some!*"

—*Manager's Handbook*

Many years ago at a prayer meeting, a reader reminds us, a man prayed: "Lord, give every poor family a barrel of flour," and some member replied, "Amen"; a barrel of sugar brought another amen and a barrel of salt another amen. Then followed a barrel of pepper and one man, noted for his profanity said: "Oh, hell, that's too much pepper." —*Wall St. Journal*

The Land-use-pattern Scale

(*From page* 12)

experimental plot tests on special study research farms, farms on which complete farm plans are in operation. In these tests, five treatments were replicated twice on each of four farms at each of benchmarks 2, 3, 4, and 5 for corn and at each of benchmarks 3, 4, 5, and 6 for cotton. The treatments used and results obtained in corn production in these tests, showing how treatments that will pay best vary with positions in the land-use-pattern scale, are shown in Table II. The contrast in returns above fertilizer costs from light and heavy applications of fertilizers at benchmarks No. 3 and No. 5 are illustrated in Figure 3. This contrast in relative returns above fertilizer costs on these two groups of soils is a reflection of the different capacities of these soils for use of fertilizers in the production of corn. The better corn soils were able to use on a paying basis much heavier applications of fertilizers. The contrast in net returns from heavy rates of applications of fertilizers on these two groups of soils would have been still greater in a normal year than they were in the wet year of 1950 when corn yields were relatively very high on the drier cotton soils at benchmark No. 5.

In spite of general recommendations of around 12,000 corn plants per acre for the area, 6,000 plants per acre for benchmark No. 6, 8000 for benchmark No. 5, and 10,000 for benchmark No. 4 may be nearer the correct numbers for these soils. Some of the soils at benchmark No. 3, on the other hand, are

TABLE I.—YIELDS, RELATIVE YIELDS, AND RELATIVE PRODUCTION OF CORN AND COTTON AT DESIGNATED POINTS IN THE LAND-USE-PATTERN SCALE, ON UPPER COASTAL PLAIN SOILS, NORTHEASTERN MISSISSIPPI, 1949.

Benchmark number	Corn yield per acre	Cotton yield per acre	Pounds of lint cotton per bushel of corn	
			Relative yield per acre	Relative total per acre
	Bu.	*Lbs.*	*Lbs.*	*Lbs.*
6 (Soil conditions 56–61, Tilden fine sandy loam D slope, 3 erosion—Ruston fine sandy loam, E slope, 2 erosion)	12.1	200.0	16.5	91.6
5 (Soil conditions 36–41, Tilden fine sandy loam C slope, 2 erosion—Savannah fine sandy loam B slope, 2 erosion)	22.4	321.0	14.3	46.7
4 (Soil conditions 26–28, Jamison fine sandy loam B 2 to Prentiss fine sandy loam B slope, 2 erosion)	35.6	395.0	11.1	23.7
3 (Soil conditions 16–18, Prentiss silt loam A slope, 1 erosion, undifferentiated colluvial B slope, 1 erosion)	37.0	276.0	7.5	.4

able to support somewhat more than 12,000 plants for those who are willing to sacrifice quality for top yields. Similarly, suitable planting dates for corn may range from about April 10 for benchmark No. 6 to June 10 for benchmark No. 2. The association of erosion control and drainage problems and methods of planting and other management practices with place of the soil in the scale should be obvious. Also obvious should be the influence of a change in relative prices in changing production of any product near the ends of the range over which it is produced.

When farms were classified according to their general position in the scale as represented by the proportion of their cropland that was on soil conditions 1 to 35, and placed in three groups, the contrasts in distributions of soils illustrated in Figure 4 for the first and third groups were obtained. The extent to which operators of these farms recognized these differences in proportions of the various soils as bases for differences in land uses is indicated by the contrasts in land uses illustrated in Figure 5 for the same groups of farms. When farms in the sample were further sub-grouped according to size as measured by acres of open land in a kind-of-land and size-of-farm classification, the percentage distribution of farms among the various groups indicated a strong tendency for farms in the rugged end of the scale to be small and those in the better part of it to be large. This distribution showed that size of farm, instead of being the independent variable that it has been assumed to be in farm-management studies, is to a very large extent determined by general position of the farm in the land-use-pattern scale, or kind-of-land. One obvious reason for this is illustrated in Figure 2: Much higher proportions of the better soils are in cultivation. Other reasons, of course, are the relative sizes, shapes, and topographies of fields, and relative use-adaptations of the soils in opposite ends of

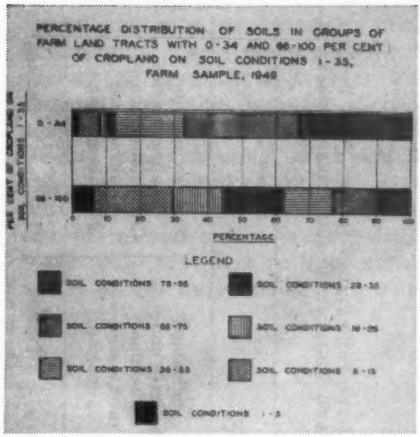

PERCENTAGE DISTRIBUTION OF SOILS IN GROUPS OF FARM LAND TRACTS WITH 0-34 AND 66-100 PER CENT OF CROPLAND ON SOIL CONDITIONS 1-35, FARM SAMPLE, 1948
PERCENTAGE
LEGEND

Fig. 4. When farms were separated into three groups based on proportion of cropland in the better end of the land-use-pattern scale, marked contrasts between the first and third groups were obtained in distribution among the various general groups of soil conditions.

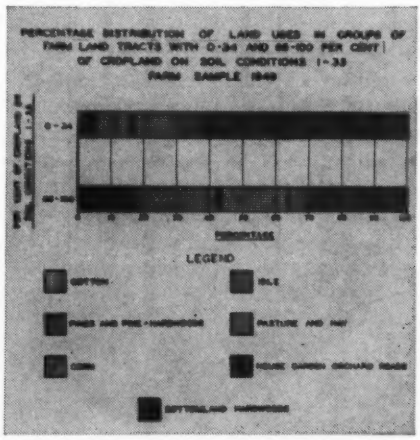


Fig. 5. Contrasts in land uses for the farms for which the distributions of soils are shown in Fig. 4 were only slightly less striking than the contrasts in distribution of soils.

the scale. Fields averaged three times as large in the group of largest farms on the best soils as in the group of smallest farms on the poorest soils.

Is it possible that, within a soils and type-of-farming area, research on relative use adaptations and adapted management practices can be done most efficiently by concentration on definite soil conditions as specific points in a continuous scale and that entire farms

TABLE II.—YIELDS OF CORN, AND VALUE ABOVE FERTILIZER COST, BY BENCHMARK POSITION IN THE LAND-USE-PATTERN SCALE, FOUR SPECIAL STUDY RESEARCH FARMS, TWO REPLICATIONS, UPPER COASTAL PLAIN SOILS, ALCORN, PRENTISS, AND TISHOMINGO COUNTIES MISSISSIPPI, 1950.*

Benchmark number	Treatments									
	400# 8-8-8 200# ammonium nitrate 18 inches spacing		600# 8-8-8 300# ammonium nitrate 15 inches spacing		800# 8-8-8 400# ammonium nitrate 12 inches spacing		100# ammonium nitrate under 200# ammonium nitrate side 18 inches spacing		200# ammonium nitrate under 400# ammonium nitrate side 12 inches spacing	
	Bushels per acre	Dollars above cost of fertilizer	Bushels per acre	Dollars above cost of fertilizer	Bushels per acre	Dollars above cost of fertilizer	Bushels per acre	Dollars above cost of fertilizer	Bushels per acre	Dollars above cost of fertilizer
5 (Drier and somewhat eroded cotton soils)	70.2	71.75	71.8	65.75	74.3	60.88	64.8	72.00	68.4	67.50
4 (Best cotton soils)	81.6	86.00	92.4	91.50	98.1	90.62	78.1	88.62	88.6	92.75
3 (Best corn soils)	94.8	102.50	105.6	108.00	124.2	123.25	87.4	100.25	109.4	118.75
2 (Wet corn soils)	47.0	42.75	56.2	46.25	58.7	41.38	31.6	30.50	36.3	27.38

* Prices used for calculating return above cost of fertilizers were $2.50 per cwt. for 8-8-8, $3.00 per cwt. for ammonium nitrate, and $1.25 per bu. for corn.

may best be studied as examples of possibilities for farms with similar distributions and acreages of soils? Such procedures would provide agronomists, animal husbandmen, and other technicians with specific guides and systematic bases for use of available information and development of further information on adapted practices that vary with soils. They would provide farm-management workers with objective bases for classifying farm records, describing farms on which similar results might reasonably be expected, and determining representativeness of farms under study. Such procedures should provide all agricultural workers with systematic objective bases for selecting adapted management practices and recording and predicting, even describing, general patterns of variation in results. Certainly, results of much agricultural research would be more usable if we could provide even approximate guides to the variations in their practical application.

You Can't Be a "Compass" Farmer

(*From page* 25)

equipment would move to it. A subsequent trade with his son Kenneth brought his total acreage to 132.

On the 132 acres Edgar has built more than 3½ miles of terraces and has 2 miles of grassed waterways. Most of his land is in a 5-year rotation of corn, grain, and 3 years of meadow. Some land that is more level is in a 3-year rotation, with a small acreage in a 2-year rotation. He uses 200 pounds of 3-12-12 fertilizer per acre with corn and grain plus manure and heavy crops of legumes which he plows under.

As a result of Edgar's changed use of the land made possible when he stopped "compass farming," he now raises three times as much livestock per acre as he could in 1940. This increased livestock production results from higher yields of both grain and

Fig. 2. Edgar Wilson finishes the last swath in mowing a grass waterway. Mowing keeps the sod tough to resist the action of concentrated water which might cause gullying.

grass crops. Hay yields are up 50 per cent and forage 300 per cent. With increased yields have come lower production costs and higher income.

He has put a basement under his house and installed a furnace and water system. There are new shrubs around the house, a new concrete floor in the barn, and a new concrete feed lot. With lower production costs and his capital assets secure, he spends less time worrying about what is going to happen down in Washington.

A gratifying recognition of Wilson's farming skill came when he was named the best conservation farmer in Indiana in a contest conducted by the Baltimore and Ohio Railroad.

Edgar makes it clear that he has stopped "compass farming" for good. A visitor looking out over the winding green strips is led to estimate what the Wilson treatment would mean to millions of farms whose lifeblood in precious soil is carried by each spring flood down to the eternal graveyard of American farm land. From a farm business whose very existence was endangered by erosion to a $172-an-acre return for labor in five years, that is what free enterprise and astute planning did for one American farmer.

Kay-two-oh in California

(*From page* 20)

the situation during World War II was in sharp contrast to our former dependence upon foreign potash. Production from the brines of Searles Lake, California, and from the more recently discovered deposits of New Mexico had made the United States entirely independent of any foreign source for its potash requirements. The selling price, instead of skyrocketing as it did in 1914, remained at a price level some 10 dollars lower than the price previous to the first world war.

Potash Reserves

Estimates of the world's reserve supply of potash, and that of the proved and potential deposits of the Western States, are in agreement on one point. Investigators all agree that at present and foreseeable future rates of consumption, European and American deposits will last hundreds of years.

Dr. Firman E. Bear sounded an optimistic note in his presidential address before the 1949 annual meeting of the American Society of Agronomy. He said: "At present rate of consumption, totaling about 800,000 tons of the element annually, the known deposits in the United States, amounting to about 1 billion tons, are enough to last about 1,250 years. Our present consumption is only about half the estimated need."

He then added this thought, mindful of possible exhaustion of our potash supplies after 1,250 years. "But every cubic mile of ocean water contains about 1¾ million tons of potassium. If the price of potash salts rises to about twice their present level, sea-water potash will enter the picture." It is a safe assumption that the farmers of the year 3200 will still require the element potassium for quantity production and for quality as they do today.

Dr. J. W. Turrentine probably is as well-informed on the potash situation as anyone. His forecast, based on presently known, easily workable deposits, is more conservative than that of Dr. Bear. Writing in 1946 of "Past Consumption and Future (1950) Requirements of Potash Salts in American Agriculture," he said, ". . . they will be ample for a minimum of 500 years at the rates of consumption projected by official forecasters and for such other longer terms of years as determined by the volume of future imports. These reserves, it may be safely concluded, will be further augmented by exploration and technological research."

What Is Fertilizer Worth?

(*From page* 26)

had a higher yield than Yost, since he had a higher stalk count. However, he had considerable damage from Japanese beetles, and the lack of a topdressing showed up in the size and maturity of the ears, which no doubt cut down his yield.

Adren Gough, who stood fourth place in yield with only a stalk count of 9,289 but with the most fertilizer, planted his corn on a hill with from 15 to 30% slope on sandy clay loam that had been in meadow for several years but had not been built up. It had no other treatment except lime sometime in the past and was rather a poor type of soil. Had he obtained a good stand, he would have stood close to if not at the top.

Junior Bolyard, the only one using an out-of-state hybrid, and the Ohio W17 has not been yielding in this section nearly as well as some of the State hybrids, planted his corn on a hill with from 18 to 30% slope on sandy loan that is considered poor land. It had been limed in 1936 with two tons lime and 8 tons of manure and 600 lbs. of 0-14-7 had been applied and plowed down. He applied 400 lbs. of 5-10-10 in the row and side-dressed with 300 lbs. of nitrate of soda. Bolyard had the best filled out and most solid corn of all the contestants.

Outstanding Demonstration

Of all the plots, William Mitchell's was the most outstanding demonstration of what the application of plant food will do. He planted on a hill top. The soils specialist said all of the topsoil was gone and there was little hope of ever bringing this land back to production. It had lain idle for several years and would not produce enough vegetation to cover the soil in the summertime. It was a sandy clay underlaid with shale, and six inches was all that could be plowed. However, Mitchell applied 10 tons of manure and plowed down with it 200 lbs. of 5-10-10 and 400 lbs. of 0-20-20. He disked in 100 lbs. of 5-10-10 and 200 lbs. of 0-20-0. A row application of 300 lbs. of 5-10-10 was made and he sidedressed with 200 lbs. of nitrate of soda. The topdressing was not put on until the corn was starting to tassel, which was late. He left a few rows without this dressing and they could be seen the rest of the season by the color and growth of the corn. His yield on this poor land was over twice the average for the State.

The Answer

But we have not answered the question we used as the title of this story. What is fertilizer worth if applied in the right amounts and at the right time for the various crops?

At first thought we would say it was worth just the amount that it would increase the yield of that crop plus any additional yield to future crops. But if we study the subject we find that there are a lot of other things that enter into it, and this is more true in the hills of West Virginia where we must stop plowing our hill lands or we will not have any to plow.

We kept pretty close records this year to see just what it cost to grow an acre of corn including the labor and fertilizer, and we found that if we allowed the farmer for his labor the amount per day that he could earn if he were working for another farmer or that he would have to pay for like labor, the average for an acre of corn in this section was $39 labor cost. This would be high, of course, in the Corn Belt where all the work is done with machinery and on large scale but here on our hills it will cost that much.

We allowed $4 per acre for rent of land, which would not pay for it until it was worn out under the average farmer's practice if it were corned continually. This gives us a cost of $43 plus the average cost of fertilizer of the eight contestants of $39.87 or a total of $82.87 per acre.

The average yield for the eight was 99.5 bushels, shelled basis. Corn was selling in the field here this fall for $1.50 per bushel. Then the acre of corn was worth $149.25. We did not allow anything for the fodder, for most of the contestants left it on the land. We believe it is worth as much plowed down as it would be cut off and fed, and a lot less labor cost. So we have a profit of $66.38 above our labor and fertilizer cost plus rent of land.

Comparisons

Now let's see what the average farmer makes on his corn when he applies an average of about 600 lbs. of 4-12-4, which is what most of the farmers use. This will cost him about $12.

He has the same amount of labor in his acre and the same rent, which means that his acre of corn has cost him $55. But he only has a yield of 44 bushels, according to the State average; and if he planted it on some of the land we planted on, he would not have had any. Then his corn was worth $66, or he had a profit of $10 for his acre.

Let us reduce it to a tonnage basis. We used an average of 1,480 lbs. per acre or 70% of a ton. Then if he used 600 lbs. or 30% of a ton, we received $56.38 for the difference of 40% of a ton, or a ton was worth to us approximately $140.

But wait, the other fellow did not have half the yield per acre that we had, so in order to grow that much corn he will have to put out over two acres. We will give him the advantage of the 11.5 bushels over twice as much as he had. He had the labor cost of two acres instead of one, so his cost for labor is $78, fertilizer for two acres is $24 and rent on land $8. Since we only plowed one acre, we had one more left in meadow which would be worth at least $20 for hay. We would have to charge that to him, making his corn cost him $130. His 88 bushels would be worth $132, or a profit of $2.

Now let's go back and see what our acre would be worth on the same basis. Our 99.5 bushels were worth at market price $149.25, but we only plowed one acre so we had that other acre to cut hay from and that was worth $20. We add that to what our corn was worth and we have $169.25. Our expense is still the same, but we have $20 worth of hay extra, or a profit of $86.38.

On a tonnage basis again, we still used the same tonnage but he doubled his on his two acres. Then he used 60% of a ton and we used 70%, so our tonnage was only 10% greater than his but our profit for the same amount of corn was $84.38 greater than his.

You know the old saying that figures won't lie but that liars will figure. We have been called all kinds of liars for claiming we produced this much corn on an acre, and on the face of these figures it may look as though we have stretched the facts somewhat. If you will study them you will see that we have not.

The Intangibles

There are a lot of intangible things in our favor that we cannot figure in dollars and cents at this time, some of them never, yet we know that they are there. Take for instance the less land we will have to plow to grow what grain we need, or other crops for that matter, if we use enough fertilizer. What will be the value to our farms and to the country in the less erosion?

We do not have the figure yet but we do know that in two years' time we have been able to see the increased production in small grains and grasses

on the fields of high fertilization. We did not rob the land with our corn crop.

There is also the fact that as we learn to grow more crops with less labor, the farmers of the country can better feed the growing population at less cost and still make more profit themselves. These are things that we know are there but cannot figure them in dollars and cents.

There is a satisfaction in producing a bountiful crop that is worth a lot to a farmer. Also there is more leisure for him if he produces the crop with less labor.

We wish in closing this story to emphasize that we are not trying to get farmers to grow corn on land that is not suitable, nor are we advocating the growing of more corn on our hill land. We tell the class that most of them would be better off to grow none at all. Most of them are growing less acres all the time, but have more corn to feed.

Soil Treatment Improves Soybeans

(*From page* 23)

level, the acre yield of soybeans was relatively high on the untreated land. Soil treatment consisting of crop residues, limestone, rock phosphate, and muriate of potash (RLrPK) increased the bean yields on these more productive soils. The oil and protein contents of the soybeans showed some variation on both fields, but in all cases were relatively high. The acre yield of both oil and protein was relatively high on these dark-colored soils.

It seems that soybean growers should aim at 500 pounds of oil per acre and 1,000 pounds of protein. These yields are entirely within the scope of possibility. It would require a 40-bushel-an-acre yield of beans. With such a yield the beans would have to have approximately 21 per cent oil and 42 per cent protein. Soybean research men are about ready to give the growers varieties which will meet these specifications. On the part of the grower it would require a selection of the best in seed and varieties and the use of the utmost in cultural skill. It would also require a careful study of the soil's needs and a wise application of the best in soil-treatment practices particularly adapted to the production of soybeans.

TABLE III. OIL AND PROTEIN CONTENT OF SOYBEANS ALONG WITH ACRE YIELD. JOLIET AND CARTHAGE EXPERIMENT FIELDS, REPRESENTING DARK-COLORED SOILS.

Soil treatment	Beans bu/A	Oil %	Protein %	Oil lbs.	Protein lbs.
Joliet 1949					
None	24	21.8	39.4	314	567
RLrPK	32	23.2	39.2	445	752
Carthage 1949					
None	28	21.1	43.9	354	738
RLrPK	33	21.2	41.8	420	828

Uncle Sam's Acres

(*From page* 5)

parks and open range lands. So with the precedent already set for acquiring nearly 53 million acres of land for withdrawal and control by the armed forces, we may not be surprised to see another round of leasing and buying.

Last summer the government sent a water resources policy commission on tour, taking testimony and experiences about wise use of scant water supplies. The commission members were astonished to get the mass of facts and suggestions and to see the awareness of the western people concerning conservation of the public domain.

More than 20 million acres of these ranges owned by the federal government need revegetation badly. At least half of them can safely be reseeded, often by using airplanes. One key to growing this seed once it is well sown is in water-spreading methods and facilities. In attempting to perform water spreading, a series of low dikes are built to retard the rapid runoff from the surrounding highlands. This water is caught as it washes down and is gradually spread fanwise over the parched but hopeful land. Much of this excess rainfall and snow moisture will seep down and percolate through the soil.

One of the best known of these artificial water-spreading systems is that located in southeastern Montana in the Little Missouri area. An original tract of 1,000 acres on which to undertake the test was mapped out. Today after a few seasons of trial, the grazing capacity of the section adjacent to Thompson Creek has increased more than thrice. Appraisal of the financial returns so far indicates that a net return of more than 12 per cent on the investment each year is being realized. Soil erosion on the one hand and flood irrigation on the other are also side benefits coming from engineered water-spreading conservation.

Recent attention has been riveted on noxious and poisonous weeds and useless brush growth which interfere with maximum grazing on all of the best western ranges. Halogeton, the sheep-killing Russian thistle type of wild plant which has spread too far and wide for comfort, is an example of the puzzle picture which range users must fit together. The chief practical way to kill out halogeton is to build up the quality of the most valuable and resistant native grasses. This is being done.

Not only are the government rangers tackling this whole range quality project, but stockmen using the pastures are contributing mightily to every phase of it. They supply labor, materials and funds. Just last year alone, the range managers said that land users paid in the equivalent of a million dollars toward rebuilding the beef-making grazing areas. This is in addition to regular fees charged for improvement budgets, and represents at least half of the cost for range improvements. It is nice to point out real cooperation between government men and western stockmen. The reverse has caught too many headlines.

But the biggest headache and dilemma for the federal rangers come when there are more than one or maybe more than two forms of land use sought, possibly on the same tract. To give each honest citizen just about what he wants and will settle for, without hurting the welfare of the others who apply, is a knotty angle to management.

Surveying and recording titles and boundaries and attending to such legalities of land management are likewise bounden duties assigned to the project bosses. Few persons are aware that all transfer records of deals made with public land are kept stored and filed in Washington. Thousands of farms in

the country were homesteads away back then. I have seen these ancient treasures unfolded and laid reverently before visitors on many farms. Sometimes they showed the signature of our earlier presidents—back when presidents did not have much more to do than a third-class postmaster, and no foreign frills to dabble in.

If any of these original title parchments get lost or burned, the heirs and assignees on any homestead farm can rest easy because all copies of patents ever issued for public land from the United States to the first owner are on file. Requests for copies of these records are received by the hundreds every week. Better yet, the newest idea is one which will finally result in depositing microfilm copies of such patents outside of Washington, probably in regional vaults.

Of course, we know that too much of the public domain has in years past been frittered away, wasted and injured, despoiled and exploited. Americans have always been like a kid in a jam closet, and in need of discipline to prevent damage and indigestion.

Some say there are too many different bureaus and divisions of federal government engaged in management of public ranges and parks and forests. It admittedly is often hard to get things all straight and to find the right agency which manages an area in question. Now with all the multiple defense alphabeticals added to the mystic circle, and some of them claiming some need for land in their work, the matter of keeping track of who's who and where will be tougher than usual.

Not only in outright management is there some confusion. More of it shows up in the various mortgages and loans involving private land to which some of the federal departments are a party of the first part. But most of us are hopeful that in due time much of this hazy and muddled situation will be corrected—although whoever gets the job of handling *all* of the real estate to which Uncle Sam is a contracting party will have a worse tangle to un-

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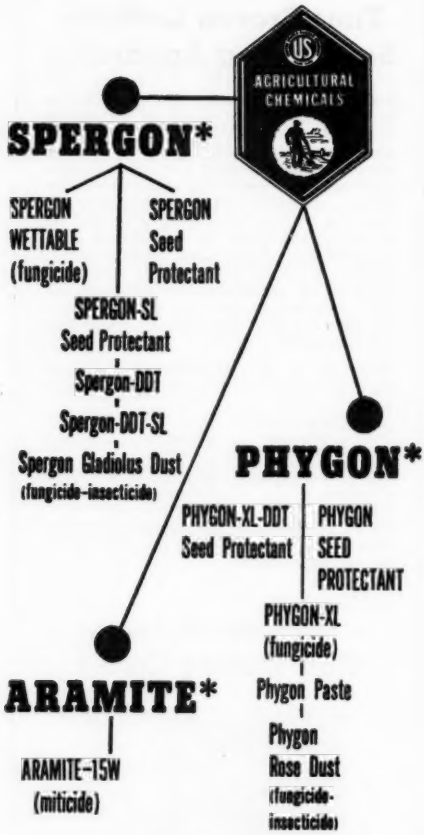

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Some of us who have loitered in federal corridors a little get another angle to this debate. You see, even if a merger takes place and a shotgun wedding unites two or more of the agencies that manage a given business, the same old jobs must be done and the same people will be dropping in and writing for services. In the end, with a certain task to perform in an allotted time, almost as many if not more employees will be needed.

You may succeed in laying all your complaints and requests at one single door, instead of wandering around in a daze hunting the right pigeonhole, but don't forget that it takes manpower and experience to answer those queries and make those decisions and carry out those actions.

Then there is the final point of background. It takes more than a surveyor or an abstract lawyer to service and manage the lands owned by Uncle Sam. Somebody must be there to know what has been done before and how well it worked out; and although we all hate those confounded legal "precedents" in court cases, we admit that experience in any land matter is a vital thing to successful stewardship.

How would you like to have a green and inexpert person undertake to pull a tooth or write a will or draw a mortgage for you? How would you enjoy having some raw newcomer take over the post of township assessor? Background is necessary to any foreground I ever knew. Otherwise when you step back a little, over you go!

So now I have completed this small outline of Uncle Sam's land business. It's a big story, worth a book to tell. Our only object in doing this is to spark the idea that there are really some trained and conscientious men and women acting as our trustees. And a good many more cooperating farmers and stockmen and promoters of business are able to make headway intelligently with these land managers of ours than we "hear tell about" in lurid yarns and feature thrillers.

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The Plant Speaks Thru Leaf Analysis (Sound, running time 18 min. on 800-ft. reel.)
Save That Soil (Sound, running time 28 min. on 1200-ft. reel.)
Borax From Desert to Farm (Sound, running time 25 min. on 1200-ft. reel.)
Potash Production in America (Silent, running time 40 min. on 400-ft. reels.)
In the Clover (Sound, running time 25 min. on 800-ft. reel.)

OTHER 16 MM. COLOR FILMS AVAILABLE ONLY FOR TERRITORIES INDICATED

South: Potash in Southern Agriculture (Sound, running time 20 min. on 800-ft. reel.)
Midwest: New Soils From Old (Silent, 800-ft. edition running time 25 min.; 1200-ft. edition running time 45 min. on 400-ft. reels.)
West: Machine Placement of Fertilizers (Silent, running time 20 min. on 400-ft. reel.)
Ladino Clover Pastures (Silent, running time 25 min. on 400-ft. reels.)
Potash From Soil to Plant (Silent, running time 20 min. on 400-ft. reel.)
Potash Deficiency in Grapes and Prunes (Silent, running time 20 min. on 400-ft. reel.)
Bringing Citrus Quality to Market (Silent, running time 25 min. on 800-ft. reel.)
Canada: The Plant Speaks Thru Deficiency Symptoms
The Plant Speaks, Soil Tests Tell Us Why
The Plant Speaks Thru Tissue Tests
The Plant Speaks Thru Leaf Analysis
Borax From Desert to Farm

DISTRIBUTORS

Northeast: Educational Film Library, Syracuse University, Syracuse 10, N. Y.
Southeast: Vocational Film Library, Department of Agricultural Education, North Carolina State College, Raleigh, North Carolina.
Lower Mississippi Valley and Southwest: Bureau of Film Service, Department of Educational Extension, Oklahoma A & M College, Stillwater, Oklahoma.
Midwest: Visual Aid Service, University Extension, University of Illinois, Champaign, Illinois.
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Department of Visual Instruction, Oregon State College, Corvallis, Oregon.
Bureau of Visual Teaching, State College of Washington, Pullman, Washington.
Canada: National Film Board, Ottawa, Ontario, Canada.

IMPORTANT

Request should be made *well in advance* and should include information as to group before which the film is to be shown, date of exhibition (alternative dates if possible), and period of loan.

Request bookings from your nearest distributor

The old lady in the East had just finished reading that it was so cold in the West that when the cattle laid down their tails froze to the ground and broke off when they got up.

"Well," she exclaimed, "this is the first time I have really understood why this extensive business of retailing cattle!"

* * *

"Gud mornin', Missus Flannigan. How er yu? And how is Mister Flannigan? Not that I gives a damn, yu know, but jist to be sociable."

* * *

Girl: "I saw you the other day at the corner winking at the girls."

Wolf: "I wasn't winking. That's a windy corner. Something got in my eye."

Girl: "She got into your car, too."

* * *

"Say, Pat . . . what's this I'm hearing about ye joining up with thim communists? Be ye daft, man?"

"It's the God's truth, Mike . . . I signed up last week. Ye see the doctor told me I had but 10 days to live and 'tis better one o' thim communists die than a good Irishman."

* * *

He was a retired businessman, turned gentleman farmer. Back in the city for a day, he was extolling the joys of farm living to an old acquaintance. "Fred, you can't beat it for relaxation. When I'm feeling low, I go out and milk a cow."

"That's the only way you could, when I was a boy," replied his friend.

* * *

Shipwrecked on a desert island, the young man proposed marriage to the beautiful lady:

Young Man (urging): "We might as well settle down because we'll never be rescued anyway."

Beautiful Lady: "But there are no ministers and it wouldn't be legal."

Young Man: "I'm not worried about that. I don't see any policemen around, either."

* * *

"My Ma don't allow me to play with you," said the boy with the freckles. "She says you're a bad boy."

"My Ma don't allow me to play with you, neither," retorted the redheaded one. "She says you're the worst boy in the neighborhood."

"Gee! We're both regular fellers, ain't we?"

* * *

It is said that at the age of 75 there are 18 per cent more women than men. But at age 75, who cares?

* * *

The hillbilly boy walked into the town confectionery and asked for an ice cream soda. The clerk presented the drink, all done up with a cherry and two straws. After a few minutes the boy called the clerk and said, "Mind ef I take them holler sticks out? They keep a-knockin' my hat off."

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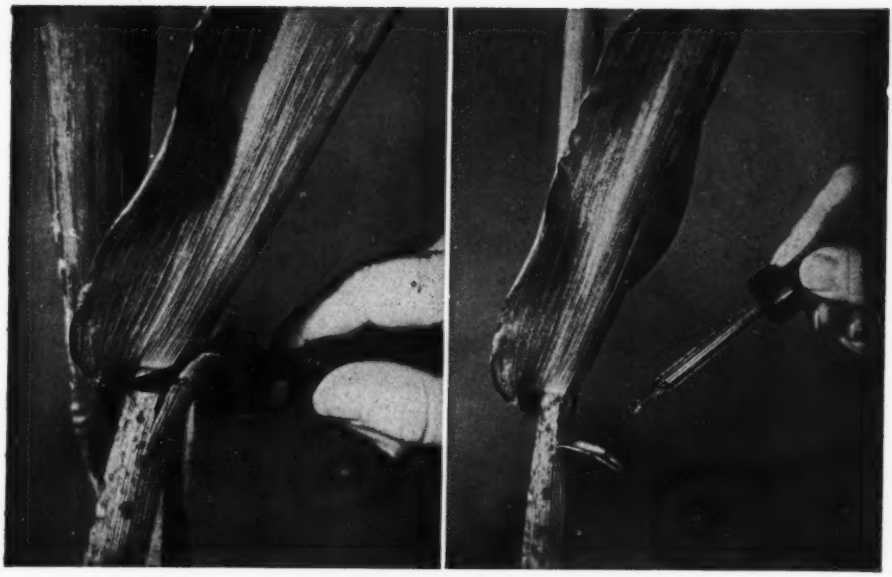

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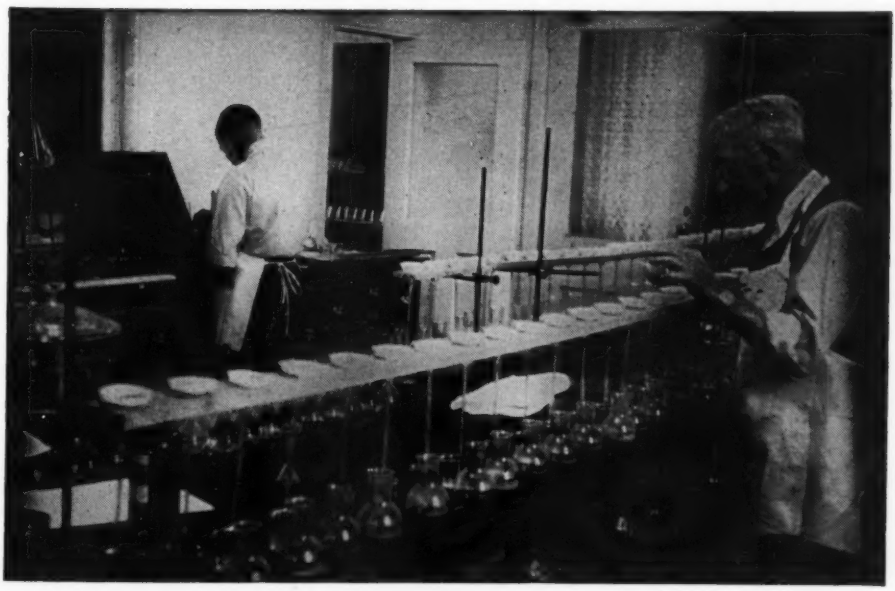

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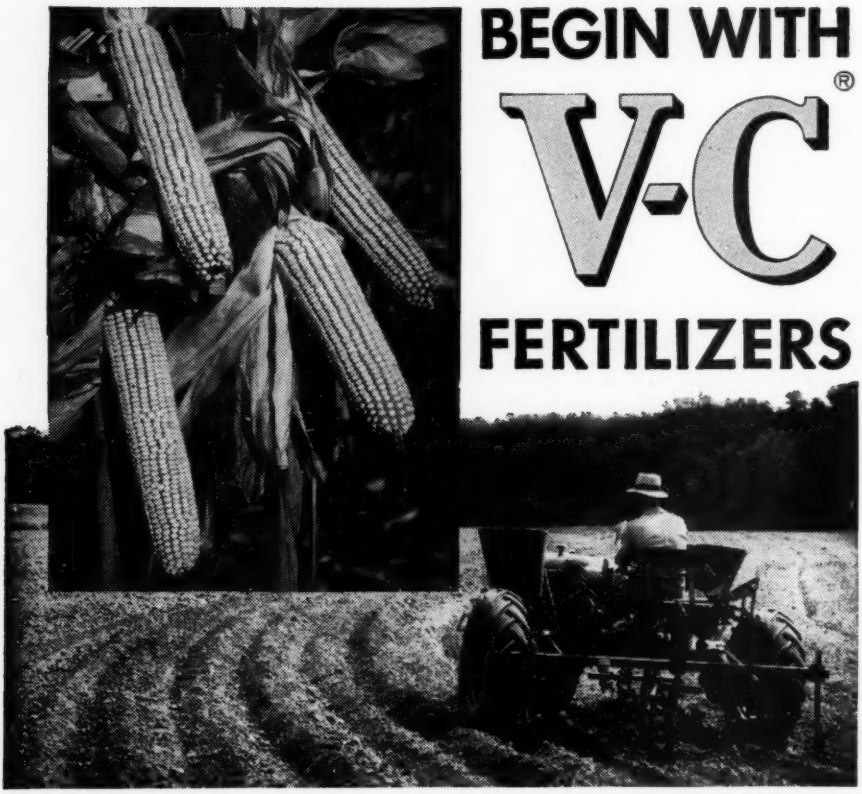

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